GRENADA

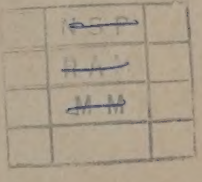
REPORT

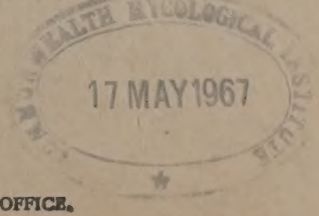
ON THE

AGRICULTURAL DEPARTMENT

FOR THE YEARS

1960—1963





GRENADA.

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ST. GEORGE'S,
1966

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Report on the Department of Agriculture, Grenada, for 1960---1963

SECTION I

Weather Conditions

Rainfall:

Annual rainfall data at selected stations is given in Table I. A review of the figures show that precipitation in 1960 was well below average and thus agriculturist had passed through three consecutive dry years—1958, 1959 and 1960. Rainfall for 1961, 1962 and 1963 was more normal. The general improvement really began in June 1960 when the adequate rains during the critical months for field establishment of crops contributed to a heartening all-round improvement in crop production.

Monthly and annual rainfall data for 1960, 1961, 1962 and 1963 as reported at stations with completed records is given in Appendix I.

TABLE I

Rainfall Inches

Station	1960	1961	1962	1963
Botanic Gardens	59.12	69.15	65.59	63.07
Mt Moritz Agricultural Station	72.24	76.07	65.34	66.29
Tivoli Agricultural Station	56.03	—*	64.57	50.01
Westerhall Agricultural Station	49.87	58.96	61.08	57.98
Ashenden Cocoa Station	77.86	92.37	99.39	84.60
Boulogne Cocoa Station	67.03	71.55	76.34	58.89
Maran Cocoa Station	86.52	102.53	96.37	94.70
Mt. Horne Cocoa Station	66.91	70.84	65.91	65.88
Mirabeau Nurseries	72.52	95.43	96.75	77.05
Grand Etang	—*	—*	135.32	118.03
Dougaldston Estate	97.88	116.87	112.57	114.33

*Returns incomplete.

Windstorms

During the four year-period under review windstorm damage to bananas was significant each year. The biggest single setback came from Hurricane Flora on the night of 30th September, 1963 when between 30 percent and in some areas 50 percent of banana cultivation was destroyed. The British Government assisted admirably through a Banana Rehabilitation Scheme involving the grant of considerable quantities of free and later subsidised fertilizer to farmers who had suffered from the hurricane and there has been an amazing and rapid recovery in banana production.

SECTION II

Fertilizer Importations

The amount of fertilizer imported annually during the period 1953 to 1963 is given below. From Table II it can be seen that farmers are now using significantly more fertilizers than in even the recent past.

TABLE II

Tons of Fertilizer Imported, 1953--1963.

Year	Tons	$ Value
1953	846	99,929
1954	1,218	162,424
1955	1,301	157,000
1956	1,672	219,000
1957	1,044	166,000
1958	2,445	348,000
1959	2,579	347,000
1960	2,102	296,000
1961	2,669	369,875
1962	2,784	344,159
1963	4,772*	550,774

*Includes a gift of 1,120 tons from the United Kingdom Government to Banana producers who had suffered from hurricane Flora.

SECTION III

PRODUCTION

I. Major Crops

Cocoa: The recovery of cocoa production was continued and by 1963 had reached pre-Janet level. However, cocoa prices on the world market declined somewhat and revenue from cocoa fell below the anticipated. Cocoa exports for 1954—1963 and the value of the crops are presented in the table below. Despite unfavourable prices cocoa remained the biggest revenue earner.

TABLE III

Cocoa Exports, 1954--1963.

Year	Exports (Cwt.)	Value $
1954	51,362	4,949,403
1955	47,362	4,158,807
1956	11,400	650,187
1957	23,308	1,387,778
1958	28,187	2,297,468
1959	38,016	2,739,777
1960	36,054	2,233,274
1961	44,389	2,298,584
1962	44,694	2,690,999
1963	54,383	3,388,011

Nutmeg and Mace

Nutmeg and Mace are jointly Grenada's second largest revenue earning crop and along with a small quantity of nutmeg oil the value of exports was $2,219,993 in 1963. A review of table IV below shows a steady increase in exports since 1951. However, whereas mace exports in 1963 were approaching 50 percent of the pre 1955 level, nutmeg exports were below 33 percent of the pre-Janet level.

TABLE IV—EXPORTS OF NUTMEG, MACE AND NUTMEG OIL, 1954—1963

Year	Nutmeg (cwts)	Mace (cwts)	Nutmeg Oil (lbs)	Total Value $
1954	48,881	7,439	4,050	2,935,227
1955	52,887	6,478	6,570	2,934,609
1956	35,626	1,169	2,385	3,946,701
1957	3,329	1,308	—	1,774,837
1958	13,017	1,363	—	4,542,659
1959	10,578	1,083	—	2,373,133
1960	10,751	1,220	180	2,756,650
1961	7,659	1,564	90	1,807,296
1962	12,768	2,147	225	1,862,240
1963	14,230	3,225	450	2,219,993

Nutmeg and Mace production for 1960 --1963 presented in Table V is based on the quantities purchased at the Grenada Co-operative Nutmeg Association's receiving centres.

TABLE V—PRODUCTION OF NUTMEG AND MACE IN POUNDS

Nutmeg	1960 (lbs)	1961 (lbs)	1962 (lbs)	1963 (lbs)
Cured in shell	504,865	597,654	537,165	688,562
Uncured in shell	1,616,343	1,951,694	1,999,225	2,681,002
Grinders	11,118	11,928	12,682	16,771
Mace				
Whole	156,751	172,543	156,903	202,380
Broken	42,222	56,549	59,440	88,493

In three years nutmeg and mace production increased about 50 percent, a really encouraging achievement.

Bananas

The reduction in banana exports between 1959 and 1961 was halted and there has been a healthy upswinging in production with a record weight of 14,553 tons of bananas shipped in 1963.

The $1,731,964 earned in 1963 was significantly more than for 1960, 1961 and 1962 but slightly less than for 1958 or 1959. Bananas remained in third place as a revenue earner, i.e. behind cocoa and nutmeg—mace.

TABLE VI—BANANA EXPORTS 1954—1963

Year	Stems Exported	Weight Tons	Average Stem Weight (lbs)	Average Price Cents/lb.	$ Total Value from Purchase
1954	108,900	—	—	—	189,237
1955	**92,243**	**—**	**—**	**—**	**139.500**
1956	67,115	—	—	—	138,500
1957	568,841	7,817	30.8	—	1,387,778
1958	947,893	11,715	27.7	5.4256	1,752,340
1959	1,151,543	13,835	26.7	4.7049	1,791,948
1960	1,104,848	12,230	27.0	4,6939	1,479,329
1961	932,509	11.581	27.82	4.8429	1,455,831
1962	1,014,162	12,580	27.78	4.7093	1,437,566
1963	1,126,844	14,553	28.93	4.8603	1,731,964

The average price paid banana producers has approximated 4.7 cents per pound over the past five years.

For the period 1958--1963 inclusive the banana bunches rejected at the pier were 3.9%, 2.1%, 3.3%, 1.8%, 2.2% and 2.4% of those offered for sale.

A Hurricane Insurance Scheme for bananas was introduced in 1959, and in 1960 a manager was appointed for the scheme which covers the Windward Islands. All registered producers benefit from group insurance for ratoon fields, however, insurance does not cover total losses but helps producers to re-establish heavily damaged fields.

Other Important Crops

Sugar Cane:—The decline in sugar production continued through to 1960, and subsequently has averaged about 860 tons annually. At present, somewhat less than 40% of the island's consumption of raw Sugar is met by production at the sole factory, the Grenada Sugar Factory Limited.

TABLE VII—D.C. SUGAR PRODUCED, 1954—1963

Year	Tons Sugar	Tons Cane/Tons Sugar
1954	2,527	10.43
1955	2,470	9.65
1956	1,403	11.20
1957	2,221	9.87
1958	2,002	10.95
1959	1,344	9.66
1960	847	11.09
1961	880	10.76
1962	804	11.10
1963	896	10.5

In 1963 there were some 520 small farmers and a few estates engaged in sugar production. The decline in production was caused largely by dissatisfaction among cane farmers, labour disputes and to some extent the droughty years, 1958 to 1960. As can be seen from Table VII above the return of tons sugar from tons cane milled has averaged about 10.6 over the decade. Strong measures are being taken to revitalise the industry and an upswing in production should occur in 1964 and 1965.

The Sugar Factory and six other distilleries annually produce about 85,000 gallons of White unblended rums which are consumed locally.

TABLE VIII—PRODUCTION OF WHITE RUM, 1955—1963

Year	Rum (Proof Gallons)
1955	86,194
1956	80,436
1957	91,395
1958	91,798
1959	85,441
1960	81,815
1961	87,250
1962	78,034
1963	84,024

Coconuts (Copra and by-Products):—Table IX below shows the production of copra and its by-products for the period 1955--1963.

TABLE IX—PRODUCTION OF COPRA AND BY-PRODUCTS

Year	Copra Milled (tons)	Refined Oil (galls)	Laundry Soaps (lbs)	Coconut Meal (lbs)
1955	—	32,028	317,550	245,800
1956	—	38,878	68,050	225,480
1957	—	27,555	170,800	194,700
1958	—	51,118	305,100	326,780
1959	454	54,118	243,400	276,700
1960	380	44,660	153,920	250,400
1961	398	44,545	155,800	235,700
1962	359	45,235	147,800	281,100
1963	473	55,905	206,050	273,600

Copra production which had made a dramatic recovery from hurricane Janet by 1959 went through a lean period from 1960 to 1962 but recovered in 1963. This industry continues to be handicapped by lack of an association or other organised body to look into its special problems. Red Ring disease of coconut has been spreading and is now accepted as needing prompt attention.

In February 1960 the price of copra rose from 12½ to 13¼ cents per pound and was followed by an increase in the price of products manufactured locally from copra.

Limes:—In 1960 there was a small increase in production over that for 1959 and the total value of exports (lime oil and lime juice) rose slightly to $84,315. But in 1961, the situation deteriorated due to reduction in the price of lime juice and the closing of the Trinidad market for juice. Nearly all lime production had to be released as lime oil. Further in 1961, the Grenada Lime Factory closed down and in 1962 limes were shipped from Grenada to Carriacou for processing into lime oil at Dumfries. Only 7,856 gallons of lime juice were shipped to Trinidad via Grenville.

Processing of Grenada's lime crop in Carriacou was not an economic success and in 1963 the mainland crop was not crushed. The serious condition of the industry was widely accepted by the end of 1963 and Government was making vigorous efforts to encourage investors to purchase and operate the Grenada Lime Factory which it is anticipated will be in operation in time to process Grenada's 1964 crop.

Cotton:—Whereas the production of lint was satisfactory during 1960, 1961 and 1962, there was a sharp decline in yield in 1963. As all cotton produced locally originates in Carriacou the reader is requested to turn to Section IV of this report for further information on this crop.

Foodcrops:—Brief comments follow on foodcrop production for each year of the period covered in the report.

1960:—The production of foodcrops was fair to good as rainfall during the planting season was satisfactory. Good crops of corn, pigeon peas, sorrel and pumpkin were obtained.

1961:—Production of foodcrops was fair. Whereas the production of fresh vegetables such as tomatoes and cabbages reach high peak, there was less corn and pigeon peas than usual.

1962:—Foodcrop production fell below normal in 1962.

1963:—There was an increase in production of local foodstuffs and most of the corn crop, which exceeded 300,000 lbs was purchased by the recently established Grenada Local Products Limited, a commercial wholesale and retail company which is providing a market for numerous agricultural commodities. A section of this organisation processes a stock feed including a local products base.

3. Minor Crops

Coffee:—Coffee trees were planted in fair quantities after 1955 and bore well during the period under review. However, neither market prices nor the total quantities involved has encouraged maintenance of this crop and plantings have been heavily curtailed.

Pimento:—For some years a grove at Laura Estate, St. David's, has produced pimento for export. This crop has begun to attract the attention of a few farmers and the plant multiplication scheme at Mirabeau Agricultural Station now provides a limited quanity of pimento seedlings for sale at the usual subsidised rates.

4. Livestock

There are only a few medium size livestock farms and livestock rearing continues to be primarily an activity dominated by small farmers. A relatively high proportion of the animals are produced in Carriacou. Despite the fact that Grenada's production falls far short of domestic requirements, a significant number of animals reared in Carriacou are exported to neighbouring territories. During 1960--1962 Carriacou shipped cattle to Martinique. But when this market secured cheaper and better cattle elsewhere the export was directed to St. Lucia.

In the meantime negotiations were made to lift the ban on livestock entering Trinidad and Tobago from Grenada and Carriacou. The ban on all classes of livestock except hogs was lifted about August 1963 and by year's end some 1,206 sheep and 1,121 goats were shipped. The local retail price of meat climbed steadily during the period and at the end of 1963 averaged 75 cents per pound for cuts of fresh beef and pork.

Hereunder are some 1963 import statistics for livestock products :

Commodity	lbs	$ Value
Meat :—Fresh, Chilled or Frozen ...	163,000	85,200
Meat :—Smoked, Dried or Salted (not in cans)	431,000	216,000
Canned Meat and Meat Preparation	296,000	202,000
Milk :—Evaporated, Condensed, Powdered	2,164,000	434,000
Other Dairy products :—Primarily butter and cheese	349,000	242,000
Eggs (dozens)	3,750	7,300

The total value of meat, dairy and poultry imports was $1,186,500 in 1963.

5. Fish

Fish landings as recorded at six major beaches have shown a steady increase.

Year	Pounds
1960	1,878,027
1961	2,108,029
1962	2,290,235
1963	2,480,814

A new price list with higher rates came into effect during 1963 and this has encouraged more regular fishing. Despite the significant increase in catches of fresh fish, imports of salted cod remain high.

Fishing is chiefly by seine, trolling, banking and drifting with hand lines. In 1962 there were 31 seines, 55 powered boats, 81 boats over sixteen feet in length, 17 sloops and 426 small boats fishing in Grenada's territorial waters. Estimates at the time indicated that over 1,600 persons were employed in the industry of whom about 1,400 were fishermen. Thirty new fishing boats were built in 1963.

SECTION IV—WORK IN THE DEPARTMENT

1. Extension Services

The Extension Services is organised in five districts, four in Grenada and one in Carriacou, while four Agricultural Assistants supervise twenty Agricultural Instructors in Grenada.

Programme Planning :—Five Extension Programme Planning Committees established in 1959 operate in the four mainland agricultural districts. Each Committee consists of a few estate managers, representatives of Farmers' Clubs, small farmers and the extension officers of the particular district. The committees met three to four times a year and focussed attention on problems of the agricultural industry. As a result of these discussions some useful changes have been made in the distribution system for releasing economic plants produced by the Department of Agriculture. The committees pinpointed agricultural roads in need of urgent repairs and assisted in organising the biennial Farm Crop Competitions. Most important, they gave members opportunities to develop leadership and to participate directly in programme planning. However, many programmes originated elsewhere.

Production :—Efforts to increase agricultural production by way of extension education and related services are spearheaded by the Agricultural Instructors. Communication with farmers is maintained by individual farm visits, group work through farmers' clubs, field days, field tours, district and territorial exhibitions as well as various mass audio-visual channels including radio, newspaper, posters, bulletins and circulars.

For the period reviewed in this report some 8,000 farm visits were made by Instructors annually. During visits, demonstrations were conducted and advise given in the selection and preparation of land for planting crops with emphasis on cocoa, nutmeg, bananas, citrus and other economic plants. Both by individual visits and field tours, officers concentrated on encouraging farmers to adopt approved methods of fertilizing, pruning, mulching crops and handling the fruit for market. Particular attention is paid to a limited number of farmers with leadership potential under a ' Key Farmer' programme. These farmers are used as focal points in initiating approved changes in agricultural methods.

Instructors maintain close individual contacts with the farming public, not only through education programmes, but by various services rendered to farmers. Annually, Instructors distributed between 200,000 and 300,000 clonal cocoa plants of improved quality along with many thousand budded plants of the following economic crops : mangoes, avocado pears, orange, grapefruit and limes. In addition, many thousand coffee and coconut seedlings were delivered. Whereas originally all these plants reached the farmer free of direct charges, as from 1963 farmers have had to pay small nominal charges for plants propagated in the government nurseries. Another major service rendered regularly by extension officers was the lining of over 100,000 feet of contour drains and vegetative barriers annually.

Group meetings with adult farmers numbered about 300 per year and concentrated on the following subjects: improving cocoa quality, increasing sugar cane production, approved planting methods. fencing and maintaining pangola pastures the need for increasing banana production, the value of voluntary work groups in various farm operations and other matters of current interest.

Extension officer played a central role in a number of major projects which should receive individual mention. The Farm Competition held in 1962–1963 was run jointly by the Extension Division and the District Extension Planning Committees mentioned earlier in this section. There were twelve classes for Grenada covering cocoa, nutmeg, banana, sugar cane, yam, pigeon peas and corn and six classes for Carriacou including limes, cotton and pangola grass. Judging was done voluntarily by farmers recruited mainly by the Extension Planning Committee.

Two major Agricultural and Industrial exhibitions were staged in Grenada during the period. The first post-Janet exhibition was sited at Tanteen, St. George's in 1960 and was opened by H. R. H. The Princess Royal. This very successful venture was the first major exhibition held locally since 1954. It was sponsored by the Government of Grenada and run by an Exhibition Committee with representatives of the Chamber of Commerce, the Department of Agriculture, the Agricultural Society of Grenada, and the Farmers' Club Council. The second major exhibition (1963) was sited at Queen's Park, St. George's, and broadly speaking was run on similar lines to the 1960 show save for the valuable supporting role played by the Trinidad and Tobago Government which financed the erection of a large display sent out from the new nation, and the assistance by way of booth from the University of the West Indies, Trinidad. Both exhibits focussed considerable attention on the key role of agriculture in Grenada's economy and provided important educational opportunities for farmers and the general public.

Late in 1963 the Extension Service undertook yet another major project—a cropland survey. The field work extended over two months. A significant finding was the large acreage (12,000 acres) reported as cultivated but lying unused. This figure represents about twenty percent of total cultivable land. It should be noted, however, that most of the unused land is of poor quality being either on steep slopes or in areas of low rainfall.

4—H Work :—The 4–H Programme for rural youths gained momentum during the four-year period and by the end of 1963 there were thirty-eight 4-H clubs in Grenada and Carriacou with a total membership of 760 youths. A significant advance was the establishment of a 4-H Council for the eastern agricultural district, viz., St. Andrew. However, lack of adequate capable voluntary leaders has contributed to uneven progress. Projects in poultry, pig and goat rearing, and corn growing were popular for boys whereas sewing and cake making were favourites for girls. In 1963 the first 4-H banana plots were established. These youth programmes form part of the Department's long term programme of encouraging farmers' children to look to farming for their future livelihood.

Home Economic :—Whereas the Extension Division has not yet begun work officially in the area of Home Economics, in 1963 this division worked in close co-operation with the Grenada Inter-Church Council for Social Welfare on an adult education programme for rural females. In its first year of operation (1963) home economics groups were initiated in seven areas: Victoria, Mt. Moritz, Woburn, Crochu, Constantine and Mt. Rose in Grenada, and Harvey Vale in Carriacou.

Agricultural Information :—An Agricultural Information Service was established in 1962 with the appointment of an Agricultural Assistant (Information). Despite handicaps imposed by limited funds and equipment this one-man service covers a wide range of mass media channels—radio, newspaper and film strips. A five-minute FARM NEWS programme over the Windward Islands Broadcasting Service was augmented in 1963 by a 10 munute FARM TOPICS programme. Late in 1963 the first issue of a quarterly newspaper called THE FARMER OF GRENADA was released with a circulation of 2,500 per issue. Farmers' response has been good and circulation will be increased.

2. DISTRICT AGRICULTURAL STATIONS AND THE BOTANIC GARDENS

Westerhall Agricultural and Livestock Station :

Westerhall Agricultural and Livestock Station (South District) is the livestock station of the department. A small herd of diary cattle is maintained, also some hogs and poultry. In addition, this station is the centre for holding cattle loaned to farmers under the Revolving Herd Scheme, is the centre for rearing pigs for sale to farmers, is the central station for holding pedigree studs for distribution to various stud centres, and is the operating centre for the Artificial Insemination Service for cattle and headquarters for the Poultry Improvement Scheme.

Pastures :—To maintain the increased number of cattle on the station resulting from the Revolving Herd Scheme, the acreage under pangola grass was increased in 1960. By 1961 a froghopper of the sugarcane type had become a problem on the station's pastures and a long term programme of spraying with Sevin and Dieldrin, was maintained by the Plant Protection Division with fairly satisfactory results over the years with highest hopper infestation occurring in late 1962.

Cattle :—The permanent milking herd only numbered 6 and later 7 mature animals and annually some 6,000 to 10,600, quarts were sold, mostly to the Grenada Dairies and Bailles Bacolet Estate.

Hogs:—The small pig unit is used to breed quailty Large Black piglets for sale to farmers as breeding stock. Between 90 and 140 weaned piglets were released annually at ten dollars each.

Sheep :—The South African Woolless ram was sold in 1961 when the Department purchased fifteen (15) Black Headed Persians through the Ministry of Agriculture in Trinidad and Tobago.

Black Headed Persian rams were then distributed to the stud centres at Hope, Tivoli, Mirabeau, Mt. Moritz, Dumfries and Limlair. Studs are hired at sixty (60) cents per service. This breed is now successfully established both in Grenada and Carriacou.

Goats:—There were no significant changes in breeding stock in 1960 and in the previous year four (4) ewes and one (1) buck were maintained. In 1961, however, a major replenishing of breeding stock occurred. Fourteen (14) pure bred goats were imported from the Goat Society in England through the Crown Agent. Included were Anglo-Nubians, ten (10) bucks and two (2) does, and two (2) Saanen bucks. In addition, five (5) Grade Saanen bucks and one (1) grade Saanen doe in kid were purchased through the Department of Agriculture, Barbados. Unfortunately, some seven (7) of the animals died. Later fifteen (15) animals were distributed to stud centres in Grenada and Carriacou. There were no major changes in 1962—1963.

Rabbits:—Rabbits also received major attention in 1961. A new and large pen was provided and five (5) grade Flemish Giant rabbits were purchased through the Department of Agriculture, Barbados. The intention was to encourage rabbit rearing among small farmers so as to provide low income groups with a good source of meat protein. The 4-H Movement was used as the outlet and in 1961 some forty-five (45) rabbits were given to 4-H'ers working on projects. An additional 32 rabbits were released through the same source in 1962.

Poultry:—The Poultry Improvement Scheme was continued during 1960-1963. In 1960 some six (6) Rhode Island Red Cockerels from dams with records in excess of three hunderd (300) eggs per annum were imported for use on the station's flock. The upgrading met with considerable success and many hens bred from these cockerels produced pullets that gave records in excess of 260 eggs per annum and one bird layed 310 eggs in 365 days. On the station, egg production over the period fluctuated between 12,000 and 15,300 per annum. Between 4,000 and 7,300 eggs were incubated each year and chick sales fluctuated between 3,600 and 6,000 yearly.

DISTRICT AGRICULTURAL STATIONS

With the greater emphasis now placed on extension work among farmers and the conducting of field trials on representative soil types throughout the island, the scope of the work at district Agricultural Stations was considerably reduced. The stations at Mt. Moritz (West) and Tivoli (North) have been reduced to small district Agricultural Centres, functioning essentially as the hub of all extension activities in the districts. Quarters for the officer in charge of the district and district Extension offices continue to be located here and small livestock improvement units (Stud Centres) maintained.

BOTANIC GARDENS—(St. George's)

The Botanic Gardens was maintained in fair condition. In 1960 a special feature was the introduction of a number of new varieties of Bougainvilleae and Hibiscus from Jamaica. In addition, twenty-one hybrid English roses were imported and planted in steel drums. A new motor mower was acquired and helped with the proper maintenance of the lawns. A few small garden beds were opened on the lawns near the main drive and were planted primarily to annuals.

In 1961, more new plants were acquired and established at the Botanic Gardens. Numerous varieties of orchids, hybrid anthuriums, water lillies, ixora and hibiscus were obtained from Trinidad by the Foreman and some ornamental plants were transferred from the Cocoa Propagation Station at Boulogne. A new nursery was establisted under ixora and hibiscus to the rear of the Old Nursery. Also a new rose garden was designed in concentric circles over a 60′ x 60′ area and planted to 51 rose trees. However, this last mentioned venture proved a failure as most of the hybrid trees perished in the 1962 dry season when there were numerous periods without pipe borne water. Propagation work at the Gardens was maintained at a satisfactory level over the period. Aa normal, propagation material was collected both in the Botanic Gardens and from private gardens throughout the St. Geotge's area. About 5,000—6,000 plants were propagated annually of which some 3,000 were sold and approximately 600 released free to various government and quasi-government compounds including Government House, Mt. Royal, Fort George, Esplanade, Tourist Bureau, Richmond Hill Institution, and the Botanic Gardens in Carriacou.

Extension work with enthusiastic gardeners, particularly in the St. Geotge's area, was stepped up during the period and in 1963 the Foreman, Botanic Gardens, was appointed to the new post of Field Assistant, Horticulture, with a transport allowance. In his new role, this officer will be able to contribute more to the development of Horticulture throughout the island.

3. SPECIALIST SERVICES

(a) Agronomy Division

CROP RESEARCH AND PLANT PROPAGATION

The Agronomy Division is responsible for crop research and plant propagation of all economic crops with which the Department is involved. Investigational and propagation work with cocoa is financed under the Cocoa Industry Improvement Scheme.

The number of economic plants propagated and distributed to farmers during the period under review is given in the table at Appendix III.

I. COCOA EXPERIMENTS ON COCOA STATIONS

The year under review were the 12th, 13th, 14th and 15th for the clonal trials. Researchers have concentrated on acquiring and more recently on testing good quality, high yielding clones on the major soil types. Observations on resistance to diseases and pests are also made, and as a control measure the trials are sprayed regularly.

A—CLONAL TRIALS

Three clonal experimints on cocoa have been in progress since 1948. At Mt. Horne and Ashenden, the trials are 9 x 9 lattices with four replications and at Maran the trial is a 9 x 9 Triple lattice with three replications. There are four (4) trees per plot at a spacing of 9 feet x 9 feet.

(i) The Mt. Horne trial is on Belmont Clay Loam—a moderately fertile brown soil mainly over ash or agglomerate. The soil has fair to good internal drainage and pH readings of 7.0 to 6.0. The site is at an elevation of 450′ rainfall is about 67 inches per annum and the mean maximum temperature is 85° F. There is no problem of exposure to wind, as well established windbreaks protect the area. An Annual fertilizer application of 12-8-24/N.P.K mixture is given at the rate of two pounds per tree in split application in June/July and September/October.

(ii) The Ashenden trial is on a Capital Clay Loam—a red soil of medium—low natural fertility occurring mainly over deeply weathered basic igneous rocks. This soil is moderate to well drained and is fairly acid, pH 5.0-4.0 with a tendency to phosphate fixation. The experiment is at an elevation of 1000′ and rainfall averaged about 86 inches per annum. As at Mt. Horne the same rate of fertilizer applications of 12:8:24 N.P.K. are given in split doses.

(iii) At Maran the trial is on Perservance Clay Loam—a brown heavy soil developed over ash or agglomerate (shoal soils), poor to imperfect drainage, giving rise to a mottled profile pH. 5.5-5.0. The site is approximately 80 feet above sea level and precipitation is about 95 inches per annum. Fertilizer applications of 12:8:24 N.P.K. are given in split doses and at the same rates as at Mt. Horne.

Results:—Appendix II shows by stations, the yield performance of the clones in the highest one-third (27 clones, including substitutions) for the four-year period under review.

It is interesting to note that for these four consecutive year, the following clones have always been in this group.

Mt. Horne:—G.S.—29, 29, 46, 18, 78, 50, 57, 36, 15, 4, 26, 75, 43, 3, 24, 62, 27 (G.S. 29 sub. for G.S. 31)*.

Ashenden: G.S. 29, 29, 78, 36, 48, 40, 40, 65, 19, 53.
(G.S. 29 sub. for G.S. 79)*
G.S. 40 sub. for G.S. 80)*

Maran:—G.S. 18, 78, 75, 77, 53, 61.

Taking the over all performance on all three stations for this four-year period: the following is a list in descending order, of the 15 best all round clonal cocoa producers, evidently suitable to a wide range of conditions in Grenada.

G.S.:—78, 29, 36, 46, 50, 57, 4, 3, 26, 18, 75, 24, 48, 77, 53.

B—Pen Manure Versus its N.P.K. equivalent with Extra Nitrogen.

In 1950 two 2 x 2 x 2 partially confunded randomised block experiments, one at Mt. Horne Cocoa Station and the other at Ashenden Cocoa Station, were established to determine whether clonal cocoa can be kept in as good condition by manuring with N.P.K. equivalent of pen manure as with pen manure itself. Each plot has nine trees represented by clones G.S. 32, 56, and 76. A 9 feet spacing was used.

The two experiments included the same treatments:

(*a*) Local pen manure (supplemented with Sulphate of Potash).

(*b*) The N.P.K. chemical equivalent of this pen manure based on its analysis and supplied as Sulphate of Ammonia, triple super phosphate, and Sulphate of Potash.

(*c*) Extra Nitrogen—supplied as Sulphate of Ammonia. Various routine cultural measures were employed including pruning, desuckening, weeding, staking, cleaning, contour drains and spraying to control pests and diseases.

Results:—Over the period reviewed, the behaviour of the clones at both Mt. Horne and Ashenden were comparable, e.g. at both locations there were distinct clonal differences with G.S. 56 and G.S. 32.

(i) At Mt. Horne preliminary results to date indicate a consistent trend in the mean response to N.P.K. equivalent fertilizer but a negligible mean response to nitrogen alone. Only during one season did one clone, G.S. 76, show a slight response to pen manure. Also there was no interaction or very slight interaction between fertilizers and pen manure.

(ii) At Ashenden there seems to be a consistent response to the N.P.K. fertilizer but no response to nitrogen alone which by itself seems to suppress yields. A response trend to the pen manure treatment seems to be developing. However, there seems to be no interaction between fertilizer and pen manure.

C—Fertilizer Trials—N.P.K.

This series of two trials was established with the object of investigating the manural requirements of clonal cocoa on the principal "cocoa" soil of Grenada for the purpose of advising farmers how best to correct the manurial deficiencies of their fields. The first trial was located at Maran in 1949 on a Perseverance Clay Loam The second trial was established at Mt. Horne in 1950 on a Belmont Clay Loam.

In both trials, a partially confounded 3 x 2 randomised block layout was used with plot spilt for the three clones viz. G.S. 32, 33 and 76. There are twelve trees in each plot i.e. four cuttings of each clone per sub-plot.

The Fertilizer treatments applied in two equal dressings annually are maintained as follows:—

N. applied as Sulphate of Ammonia at three levels 0, 1 and 2
P. applied as Superphosphate at two levels 0 and 1
K. applied as Sulphate of Potash at two levels 0 and 1

A light prick forking and circle mulching followed each application and routine cultural operations as weeding, prunning and spraying for pests and disease were carried out.

Results:—(i) At Maran there was significant difference in yield between clones, with G.S. 76 producing higher than G.S. 32 and 33. Broadly speaking there has been lack of response to any of the treatments, or where they occur, they have been very small e.g., N2 K. Phosphate seems to depress yields most often than not whilst potash has been given to a small response. A close study of the behaviour of this and other experiments is contemplated.

(ii) At Mt. Horne G.S. 76 again far out yielded G.S. 32 and 33. Response to potash were obtained for all clones. Over the period the response to nitrogen have not been consistent. There have been indications of a slight interaction between nitrogen and potash. The response to phosphate, too has been inconsistent.

D—Cultural Experiments:—Forking, mulching and forking-in-mulch trials.

The two experiments in this series located at Mt. Horne Cocoa Station and Carriere Estate are being used to investigate the response of clonal cocoa to heavy dressings of cut bush mulch grass etc., with and without forking the mulch into the soil. The Trial at Mt. Horne on a Belmont Clay Loam was started in 1950 and the other at Carriere Estate on a Capitol Clay Loam, in 1953. The treatments are (F) Forking, (M) mulching, (M) forking-in-mulch, and (C) control in a 4 x 2 x 2 randomised block design which partially confound two of the three degrees of freedom for the clones and fork-in-mulch interaction.
ion.

Four clones are used in each experiment—Mt. Horne G.S. 5, 32, 56, 73; Carriere G.S. 11, 29, 32, 36. Each plot contains 10 cuttings at 9 feet by 9 feet spacing. The (M) and (MF) plots, in both trials have received 2000 lbs. of green elephant grass per plot applied in split applications the first between January and May and the second between August and October of each year, followed by forking the (F) and (MF) plots after the second application. Routine cultural operations as weeding, pruning and spraying for pests and diseases were carried out.

Results:—(i) At. Mt. Horne Cocoa Station there has been little response to forking, in fact recent indications are that there was a negative response to forking which depressed the yields of certain clones. In contrast, there seems to be a clear positive response to mulching but with the forking and mulching interaction there was little or no response.

(ii) At Carriere Estate, it would appear that the effect of forming is slight and obscure, but again there has been a clear response to mulching with a supression of yields from the Forking and Mulching interaction.

II COCOA EXPERIMENTS CONDUCTED ON PRIVATE ESTATES

A—Clonal Trials

The aim of this series of four trials is to compare the quantitative yields of various I.C.S. and G.S. clones under local estate conditions. Under test are G.S. 5, 29, 36, along with I.C.S. 1, 6, 8, 39, 40, 60.

Two of the experiments were begun in 1953—one at LaTaste Estate, St. Patrick and the other at Grand Bras Estate, St. Andrew. The other two were started in 1954—one at Hope Estate, St. Andrew and the other at Carriere Estate also in the Parish of St. Andrew. All these experiments consist of sets of four randomised blocks which are contiguous and each block consists of eight plots of four cuttings at a 10 feet spacing. Each tree was given two applications of mixed fertilizer (N.P.K. as 12:8:24) per annum applied in June/July and September/October. Operations like pruning and weeding were carried out by the Estates. Whilst spraying for control of pests and diseases was carried out by the Cocoa Industry Improvement Scheme.

Results:—In earlier crop years, the performance of the better G.S. clones like 36 and 29 compared favourably with the better I.C.S. clones like 39, 40 and 60. In later years, however, the I.C.S. clones seem to have come into their own to give some good yields which in some years attained significance over the local selections. These better I.C.S. clones have been regularly included in the mixture of clonal plants distributed to farmers. The percentage is however kept small so as not to influence the Grenadian cocoa flavour, and due to their susceptibility to Ceratostomella disease.

B—A Liming and Manural Trial

A liming and manural trial was established at Hope Estate on a Hope Clay, an alluvial soil, to determine the effects of liming on soil acidity as well as on major elements. The trial which is on a minor soil type was intended to provide evidence either for or against the local practice of liming. The first application of lime occurred in 1960.

The design is a 2 x 2 x 2 x 2 factorial with two cocoa trees per effective plot. Treatments were: Burnt lime, 10 lb. per tree; Sulphate of Ammonia, 2 lb. per tree, Triple Superphosphate, 1 lb. per tree, and Sulphate of Potash, 1 lb. per tree. A 10 feet by 10 feet spacing was used and routine cultural operations such as pruning, etc. were carried through.

Results:—An early report suggested that liming had no significant effect on yield but rather tended to reduce yields in the presence of nitrogen and/or potash. Potash increased yields only in the absence of liming. Responses to nitrogen and phosphate were small. No recent analyses were presented and it is planned to abandon this trial.

C—A Hybrid Seedling Trial

An experiment was started in July 1959 to test the yield of hybrid seedlings of controlled crosses using G.S. 29, 36 and I.C.S. 1, 6, crossed with S.C.A. 6, 12. The eight crosses were:—

(1) G.S. 29 x S.C.A. 6
(2) G.S. 29 x S.C.A. 12
(3) G.S. 36 x S.C.A. 6
(4) G.S. 36 x S.C.A. 12
(5) I.C.S. 1 x S.C.A. 6
(6) I.C.S. 1 x S.C.A. 12
(7) I.C.S. 6 x S.C.A. 6
(8) I.C.S. 6 x S.C.A. 12

A four randomised block design was used with Blocks 1 and 2 at Dunfermline Estate and Blocks 3 and 4 at nearby Boulogne Estate. In each block there are eight plots containing twenty five (25) seedlings each. The spacing is 13 feet by 10 feet and one pound of 12:8:24 N.P.K. fertilizer was applied in split doses approximately 6 months apart—either June or July and again either in November or December. Routine cultural operations were performed each year.

Results:—Data for the 1961-62 crop year based on the Boulogne half of the experiment showed yields between 182 and 284 pounds of dry cocoa beans per acre, when the trees were in their third year. The 1962-63 returns were not available.

D—Hybrid Seedling Observation Plots and Hybrid Seedling Gardens

The Cocoa investigational programme included observational work on hybrid seedling plots on the following estates: Dunfermline, Mt. Horne, Paradise and Grand Bras. Under the supervision of staff of the Cocoa Industry Improvement Scheme, these plots are weeded and pruned as considered necessary.

In addition, in 1958 and 1959 two hydrid seedling gardens were established at Mirabeau Agricultural Station to produce seedlings of the following crosses:

I.C.S. 1 x S.C.A. 6	I.C.S. 6 x S.C.A. 6
I.C.S. 1 x S.C.A. 12	I.C.S. 6 x S.C.A. 12

The plots showed fair progress in earlier years and supplying was done where necessary. First seeds were reaped in 1962 and the beans were sown in pots at Boulogne Station and distributed to farmers. The 1963 crops was treated in like manner.

BANANA INVESTIGATIONS (1960—62)

Aims and objectives:—To determine the responses of lacatan bananas growing on different soil types to nitrogen, phosphorus and potassium fertilizers and to estimate preliminary optimal levels for these amendments.

Six banana fertilizer experiment were laid down in Grenada on varying soil types by Regional Research Centre, St. Augustine, Trinidad, in collaboration with the Department of Agriculture.

They were as follows:—

Location	Soil	Date started
(i) Simon Estate	An alluvium, Simon Clay Loam	1959
(ii) Brimington Estate	Wet Climate Red Earth	August, 1960
(iii) Tufton Hall Estate	"Shale" soil (very wet area)	December, 1960
(iv) Mt. William	Wet Climate Red Earth	December, 1960
(v) Belmont Estate, St. Mark	'Shale' soil	February, 1961
(vi) Mt. Nesbit Estate	Shoal Soil	August, 1961

Design:—3 x 3 x 3 factorial N.P. and K.

Spacing:—8′ x 8′

No. of plants per plot:—6

Fertilizer frequency:—3 times per year—May/June, August/September, early December.

Treatment:—0, 2 and 4 lbs N. per plant per year
0, 1 and 2 lbs P. per plant per year
0, 2 and 4 lbs K. per plant per year.

Results:—

(i) **Simon Estate:**—The trial on Simon Clay Loam (an alluvium) Results of the trial at Simon Estate, estaolished 1959, were presented for a number of periods. This experiment was irrigated during dry seasons. During the initial stages the high nitrogen, medium phosphate and medium potash levels yielded highest. Over the next six months the medium nitrogen, zero phosphate and medium potash levels were highest. Data for the second year showed the highest yield from zero nitrogen, high phosphate and medium potash.

Throughout the experiment a high response to the medium dressing of potash was obtained. In contrast, the response to nitrogen was good in the initial stages but declined steadily as the trial progressed and nitrogen actually depressed yields in the second year. The response to phosphate varied at each stage.

(ii) **Brimington Estate:**—(Mean treatment yield) tons/acre

	Nitrogen	Phosphate	Potash
Zero level	0.8	0.0	0.2
Medium level	1.3	2.3	1.8
High level	1.7	1.7	1.9

(iii) **Tufton Hall:**

Zero level	0.0	1.2	0.7
Medium level	1.7	0.8	0.9
High level	1.0	0.7	1.2

(iv) **Mt. William:**—(Number of bunches produced or shot)

	Nitrogen	Phosphate	Potash
Zero level	32	6	29
Medium level	41	49	42
High level	38	56	30

(v) **Belmont Estate, St. Mark's:**—(Mean treatment yields) tons/acre.

	Nitrogen	Phosphate	Potash
Zero level	2.2	5.1	3.6
Medium level	6.3	4.9	5.5
High level	6.3	4.9	5.6

(vi) **Mt. Nesbit Estate:**

This experiment got off to a poor start due to bad drainage. Visual rating showed a strong response to the medium level of nitrogen with a higher one to the high level. There was a slight response to the medium level of potash but none to the high level nor to phosphate at any level

In 1963, WINBAN assumed complete responsibility for the Banana Investigation work in this territory, and from 1963 onwards reference should be made to the Annual Report of that organization for the results of investigational work on that crop.

Tetraploid Banana Seedlings

Tetraploid banana seedlings from Jamiaca were planted at three sites in 1960—Mirabeau Agricultural Station, Annandale Estate and Simon Estate. Each site included six blocks each planted to a different variety. The seedlings under observation were 1,847, 2,390 (2), 8179 (2), 10,304 (8), 10,137 (1) and 10,648 (1). Records were kept of date of planting, dates of shooting and reaping bunch weight, number of hands of 10 or more good fingers, height of plant at shooting and girth of pseudostem.

Unsatisfactory soil conditions affected the plots at Annandale and this site was abandoned in November, 1961. In 1962 two varieties, 1,947 and 10,648, were selected as fit for further test. All the clones were dug up and about 100 suckers of two superior varieties were planted both at Simon Estate and Mirabeau Agricultural Station with a similar number of Robusta suckers for comparison. During 1963 records were maintained for bunch weight, height and girth at time of shooting. The test continues.

FOOD CROP INVESTIGATIONS

A number of observation trials and a few more formal investigations have been undertaken with various food crops over the past few years. Yams, sweet potatoes and pigeon peas have received more attention than the others which include tomatoes, tannias and eddoes.

Yam: Manurial, fertilizer and varietal trials have been attempted on Belmont Clay Loam and Capitol Clay Loam soils but not enough tests have been made to permit firm recommendations.

There are indications that dressings of pen manure dug into the bank increased yield and that bagasse or other organic matter incorporated in trenches prior to planting the yams contributed to the production of smooth, well formed tubers.

Pigeon Peas: In 1962 a number of local strains of pigeon peas were selected for the following characteristics: high yields, early bearing, evenness in bearing, and resistance to disease. Promising strains were established at Mirabeau Station and in 1963 some twelve of the strains were retained whereas ten strains were discarded.

The pigeon pea strains retained for further observation were:—

G.pp. 08/62	Puerto Rico
09/62	G.pp. 04/62
21/62	17/62
01/62	15/62
02/62	16/62
03/62	
13/62	

Those discarded were:

G.pp. 05/62	14/62
06/62	18/62
07/62	19/62
10/62	20/62
11/62	12/62

Tannias and Eddoes: Selected cultivars of tannia and eddoe are being multiplied and morphological discriptions of foliage have been recorded.

Tomatoes: Various varieties of tomato (Hot Set, Pink Deal, Summer Cherry, Narcarlan and Early Albertha) were included in an observation plot at Mirabeau and records were kept of growth characteristics and resistance to fungal diseases.

The promising selections were Hot Set and pink Deal.

Hot Set: Outstanding as an early bearer—8½ weeks from sowing to harvesting. High yielding and resistant to fungal wilt. Fruits are of reasonable size (3 to 4 to the pound).

Pink Deal: High yielding, size of fruits (2 to 3 to the pound).

2. A fertilizer observation trial was planted on 5th July, 1963 with Hot Set variety using the following fertilizer treatments:—

N. One bed of 12 plants (4 ozs Suphate of Ammonia per plant).

P. One bed of 12 plants (4 ozs Tripple Super per plant).

K. One bed of 12 plants (4 ozs Sulphate of Potash per plant).

NPK mixutre 12 plants (4 ozs 12:8:24 N. P. K. per plant).

4:8:12 (Sulphate of Ammonia to Triple Super to Sulphate of potash 4 ozs per plant)

Control—nothing.

Results:

Treatment	No. of fruits	Wt. (Lbs)
N	26	2¼
P	266	30½
K	50	3½
NPK/mixture (12:8:14)	151	23¾
4:8:12	260	42

The response to NPK (4:8:12) mixture and to phosphate was very good and yields from 12 plants treated with phosphate alone were as much as 90% more than Potash alone from a corresponding number of plants and 93% more than those treated with N. alone.

Paw Paw: Two varities of paw-paw introduced from Puerto Rico were planted at Mirabeau Station, but subsequently went down with Mosaic disease.

INVESTIGATIONAL WORK ON NUTMEGS

Investigations on various methods of vegetative propagation of nutmegs were continued during the period. With time, increased care has been given to the selection of propagative material. Marcotting and approach grafting received considerable attention but by 1962 the latter method appeared less satisfactory and has received decreased consideration.

From 1961 efforts have been made to test the efficiency of certain rooting harmones on various types of marcotting material. A 1961—62 trial included Seradix K, Seradix L—30, Seradix L 15 and control treatments whereas in a 1963 trial different harmone preparations: Indolbutyric Acid, Napthalene Acetic Acid along with Seradix L—15 and control were tested.

(b) BANANA

By 1963 Bananas had consolidated its position as a major crop in Grenada. Whereas 13,835 tons of banana had been exported in 1959 this should be regarded as the immediate post hurricane

"Janet" peak in the absence of long term committments by farmers and Government. Droughty conditions in 1959 and 1960 touched off a decline and production fell to 11,581 tons in 1961. A new Banana Officer was appointed early in 1962. The new policy for bananas was quickly reflected in an improvement in production which reached a record 14,553 tons by 1963. Hurricane "Flora" on 30th September 1963, did affect yields adversely but production is expected to continue to increase.

On secondment for two years in the first instance, the new Banana Officer's salary and transport allowances are equally divided and paid for by the Grenada Banana Co-operative Society, and Colonial Development and Welfare. The Banana Officer operates as an extension specialist and concentrates on the following:—

Training extension officers of the Agricultural Department in the preparation of banana planting materials, and the proper planting, pruning, fertilizing, weeding, harvesting, handling, preparation and packing of bananas for market.

Field days and tours to educate farmers by method and result demonstration.

Group work with small producers, particularly through organised farmer's clubs.

Laying down and management of small banana nurseries to supply growers with good quality plants.

Assisting growers to secure regular supplies (importing when necessary) of planting materials.

Securing and distributing fertilizers and passing on research findings on bananas on the major soil types.

Organising field work following upon windstorm or hurricane damage.

Performing liaison work between farmers, the Agricultural Department and the Grenada Co-operative Society and in particular to assist with the Society's Fertilizer Credit Scheme for small farmers.

Grenada's farmers made valiant efforts to increase efficiency in banana production and a number of estate producers extended their acreage under sprinkler irrigation and planted and maintained higher percentages of land under pure stand bananas. Also, a few accompanied technical officers on educated tours in Guadeloupe and Martinique and adopted successful new field practices. The average stem weight for all exported bananas climbed from 26.7 lbs in 1959 to 28.9 lbs in 1963.

The Grenada Government, The Grenada Banana Co-operative Society, Geest Industries Ltd., Winban, Regional Research Centre and farmers all co-operated to increase efficiency in the local banana industry. Government stepped up the maintenance programme for banana roads. A price adjustment scheme skillfully operated by the G.B.C.S. helped support ex-pier prices paid farmers during the winter months. The G.B.C.S. also operated a fertilizer Credit Scheme. Geest Industries Ltd., maintained incentives including an incentive bonus paid to farmers whose fruit met specified quality standards, introduced paper wrapping of fruit, and began operating their own ships of the Geest Lines. Regional Research Centre appointed an Agronomist for bananas in Grenada early in 1963 and a number of fertilizer trials were reaped that year under his supervision. Farmers, for their part, became pychologically and economically committed to bananas as a permanant major crop.

By 1963 Windward Island bananas had secured such a position on the U.K. market that Mr. Egbert A. Tai Director of Research, Banana Board, Jamaica, paid a visit to the Eastern Caribbean in March, 1963. At that time he stressed in a report the outstanding superiority in handling bananas from field harvest to loading on ships that these island enjoyed over Jamaica. At the same time he was impressed by banana research and field operations in the French West Indies, but not in the British Eastern Caribbean.

(c) CANE

By 1962, with production down to a mere 804 tons of dark crystal sugar, it was realised that the sugar industry was on the verge of collapse. There had been no Cane Farming Officer since early 1960 and in keeping with Government's determination to revamp and revitalize the industry, a Cane Farming Officer was appointed in September, 1963.

The New Cane Farming Officer set out among other aims to achieve the following:—

a rapid expansion of the acrege under cane so as to up annual sugar production to about 3,000 tons.

the planting of pure stand cane of the highest yielding varities.

the promotion of good cultural practices including the application of higher rates of fertilizers of the types suited to the cane belt.

the encouragement of harmonious relations between all sections of the community involved in cane production and the manufacture of cane.

By October 1963 a few setts each of new varieties, B.42231, B.52017, B.54142 and B.57150 had been received from the Central Breeding Station, Barbados, and were established in a plot at Mirabeau Agricultural Station for multiplication. In November two nurseries were established in the cane belt, one at Calivigny Estate and the other at Westerhall Estate, to help supply cane farmers with free planting material during the next few years when relatively large acreages would be planted to cane. For the two nurseries a large quanity of planting (11,000 setts) of two varieties, B.49119 and B.45151, were imported from Barbados.

Another advance was secured in November with the estabilshment of a cane variety trial at Calivigny Estate on a Mt. Hartman Clay Soil. Six varieties B.34101, B.41227, B.45151, B.47419 and B.50135 were included for testing.

Two other encouraging developments were achieved late in 1963—the revival of Cane Farmer's Association, and the appointment of a Sugar Industry Committee by Government for the purpose of restoring interest and confidence in the Industry.

(d) PLANT PROTECTION

In the period 1960—1963 there were a number of changes in headship of the Plant Protection Division. In 1960 Mr. R. E. Pierre was replaced by Mr. E. S. Holgate. In 1962, Mr. Holgate returned to Jamaica and Mr. G. L. Ogilvie present holder of the post was appointed. When he left for the United States of America late in 1963 to pursue a U.S.A.I.D. course in Plant Protection and Plant Quarantine, the Senior Plant Disease Inspector was appointed to act.

The Plant Protection Division is one of the largest divisions of the Department, and exclusive of team leaders and daily workers of the spraying gangs included in 1960 some thirty officers, mechanics, motor drivers, clerks etc. In addition to advising farmers, assisting with checking windstorm damage and supervising the spraying of infected crops, the staff operates a number of plants protection depots where farmers may purchase pesticides, fungicides etc. A couple of these depots were closed to sales during the period under reveiw and by the end of 1963 only the depots at St. George's, Grenville, Sauteurs and Gouyave were operated both for storage of materials and equipment as well as sales outlets. The servicing of spraying machines and transport vehicles continues to be centralized in the St. George's Depot.

The division is responsible for the control of all major plant pests and diseases of economic plants. Spraying and other control measures are concentrated on banana and cocoa cultivations; but other crops, especially cane, receive considerable attention. Approximately $200,000 are spent annually on bananas spraying from a cess collected on exported bananas. In recent years about $50,000 was spent annually on the control of Cocoa Beetle and Witches Broom Control. Comparatively small sums were expended on controlling Frog-Hopper of cane and love vine.

BANANA

Banana Leaf Spot (Cercospora musae)—Originally money for spraying to control leaf spot was provided by an Agricultural Rehabilitation grant, but for the period being reviewed the money for the extensive leafspot control programme was net by funds collected under a cess on export bananas.

Between 126,000 and 130,000 acre sprayings were done annually using between 80,031 gallons of orchard oil in 1960 and 111,063 gallons in 1963. Copper Oxychloride is added to the oil to effect better control in heavily infected areas.

In 1960 and 1961 control of Leaf Spot was good or fair but by 1962 and 1963 control in wetter areas was only moderate to fair. On an average slightly less than one gallon of oil is used per acre per cycle due to the high percentage of interplanted bananas.

Nemotodes (Radopholus Similis)—This disease was first identified in local commercial banana cultivation at Annandale Estate in 1959. It had become a major problem by 1960. Dipping of cleaned suckers in a nematocide.Nemagon, has given satisfactory control and thus treatment is now widely used at time of planting. With general adoption of this tehnique the incidence of nematode infection fell off and by 1963 attacks by the nematode worm were described as comparatively light.

Banana Borer (Cosmopolites sordidus)— This pest is no longer regarded as a serious problem as growers apply 2% Aldrin dust to banana suckers as a routine cultural practice at time of planting.

Panama Disease (Fusarium Oxysporum)—This disease still manifests itself wherever Gros Michel is grown and farmers have been replacing this variety with Lacatan and Robusta, both of which are highly resistant to the disease.

COCOA

Cocoa Beetle (Steirastoma Breve)—This pest was fairly rampant particularly in the northern districts and it was decided to concentrate the limited funds for control of this pest in St. John, St. Mark, St. Patrick and St. Andrew. Other acres were sprayed only after inspection indicated definite concentration of the pest. Throughout the four-year period control of cocoa beetles remained unsatisfactory.

Cocoa Thrips (Selenothrips Rubrocinctus)—Cocoa thrips is a fairly important pest in Grenada but unlike beetles its control is not provided for by direct assistance under existing votes; but in practice where ever beetles are sprayed, thrip control is also effected. Control work was done on request by and at cost to the farmer. Some 1431 acres to 2,844 acres were sprayed annually with Dieldrin.

Witches Broom Disease (Marasmius Perniciosus)—steady control programme was maintained throughout the period by experienced workers. Between 16,204 and 33,000 acres of cocoa were transversed and inspected annually. Records show that between 15,308 and 21,998 affected trees were treated annually.

OTHER CROPS

Sugar Cane Froghopper (A. varia)—Throughout the period about 200 acres were treated annually with 2% Aldrin dust, Agrocide, and Dieldrin with fairly satisfactory results.

Moth Borer (Diatraea Canella And D. Saccharalis)—Dr. Fred Bennett, entomologist attached to the Commonwealth Institute of Biological Control, visted Grenada in April 1961. He confirmed that two species of Diatraea (D. Canella and D. Saccharialis) attack canes here. Dr. Benett supplied parasites for liberation. Some 1625 Lixophaga diatraea and a few hundred specimens each of Goniosus spp, Bracon chinesis, Paratheresia claripalpis and Apantales diatraea were

released at Hope Vale, Calivigny and Woodlands Estate in 1961. Biological control of cane borer in Grenada has been inconclusive and is being continued.

Red Ring Disease (A. Cocophilus)—Red Ring has been spreading steadily in Grenada and by 1962 was causing considerable alarm among producers. Recent research in Trinidad has shown that the Coconut Beetle is one of the the agents responsible for the spread of Red Ring Disease and the staff of the Plant Protection Division began a limited campaign of spraying young trees by request as protection against beetle attack. The situation continued to deteriorate.

Love Vine—The treatment of this parasite was maintained on Government properties at a cost that varied between $496 and $720 annually. Control work was also done on some private properties. Under law, farmers can be made to cut and burn this parasite but notices were not always served and when served were often disregarded. This parasite is definitely spreading.

Mealy Bugs And Scale Insects—Some 150 Cryptolaemus affinis were imported in 1961 and liberated at Belle Vue estate, St. Andrew, for the control of mealy bugs and scale insects.

(e) LAND USE

A Land Use Officer was appointed in 1960 after the post had remained vacant for about one year. The new officer, supported by the Land use Assistant, forcussed attention on the goal of encouraging farmers to adopt sound soil conservation and land use practices suited to the capability limits fo their soils. Over the years under review the two officers in this division worked by a programme through which detailed soil maps and farm plans were prepared for many of the large estates and numerous small farms especially those operated by 'key' farmers who received more than average attention from the district extension officers. Thus the Land Use Officer has operated as an extension specialist and the division has provided advisory services in support of the district extension staff. Carriacou, with its serious soil conservation problems arising out of excessive soil erosion, receives 2—3 visits annually from Land Use Staff.

Under a United States of America I.C.A. programme the Land Use Officer attended a Land Use and Land judging Seminar held in St. Vincent in 1960 for Agricultural Officers of the Windward Islands. In 1962, he attended a four-and-a-half-month course in soil conservation at Ohio State University, and Puerto Rico. After returning from the seminar, the Land Use Officer taught local agricultural extension officers land judging and involved them in two contests to determine their knowledge of Grenada's major soil types and approved land use. This was the beginning of a long term plan to teach farmers a greater appreciation of agricultural soils.

Local Agricultural research is another area in which the Land Use Division has assisted. From 1962 onwards this division has developed close liaison with the Agronomy Division, which is responsible for all crop research in the Department of Agriculture. The Land Use Division now plays a major role in selecting representative sites for establishing field experiments.

Mention is made here of a research thesis on the soils of Grenada which was prepared and presented for a graduate degree by Mr. Abu Zeid of the University of the West Indies, St. Augustine, Trinidad. The Land Use Division rendered valuable assistance during the researcher's visits to Grenada.

(f) LIVESTOCK AND VETERINARY

In 1960 for the first time the Department employed two Veterinary Officers to serve the public but one left in 1961. During the period under review the two divisions, Livestock and Veterinary, were officially united under the control of the Veterinary Officer.

An additional, a second, Veterinary Assistant was appointed in 1960 and for the purpose of the artificial insemination service the island was divided into two. The new assistant was posted in the north of the island and the more seasoned officer worked in the south where the Livestock Officer resides at and operates from Westerhall Station and is responsible through the Veterinary Officer for animal production while the Veterinary Assistants are primarily concerned with answering calls for artificial insemination of cattle and assisting with minor surgery—mostly castration of various classes of farmers' Livestock.

The Veterinary Officer was on vacation leave in 1961 and the Supernumary Veterinary Officer carried on until his return after which the latter left for service in St. Vincent. The Livestock Officer went on two years vacation and study leave from 1st October, 1963 and an acting appointment was made. In August 1963, the senior of the Veterinary Assistants went to the U.S.A. and Puerto Rico on a five months course in artificial insemination and an Agricultural Instructor was trained and appointed to help maintain the insemination service during his absence.

Up grading of cattle is being attempted through the Artificial Insemination Scheme. In addition to the appointment of a second Veterinary Assistant mentioned above, another important change was the switch from using local bulls' semen to imported frozen semen of proven sires in Ontario, Canada and from the U.K., a wide variety of bulls is being used. Because of the change over to imported semen, the role of the laboratary at Westerhall has declined and the refrigerator, microscope and related equipment has been transferred to head office, St. George's where the two metal "bull barns" for storing frozen semen are kept.

Some 350 to 500 artificial inseminations were done annually. About 66% are first services and the remainder are repeats. Only 351 inseminations were made in 1960 but following the appointment of the second assistant the number increased. The increase, however, was not as consistent as anticipated due to interruptions in the telephone service and other communication difficulties

and staff changes. But the appointment of the second Veterinary Assistant has assisted materially with the distribution of the services. Whereas in 1960 as high as two-thirds of the artificial inseminations were concentrated in St. George's and St. David's, by 1963 the area distribution was more uniform on the mainland and in addition included Carriacou.

Semen from a couple of bulls which are still maintained at Westerhall is used only to a limited extent and 300 and more vials of frozen semen, mostly Red Poll and Jersey, are imported annually at a cost of approximately $2.75 (W.I.) each. The "bull barns" annually use about 10,000 lbs. of dry ice (CO_2) costing nearly $2,200 per year.

Efforts to improve the livestock industry have also included attempts to increase the quantity of animals produced. The Revolving Herd Scheme was expanded by the purchase of a further ten cows and heifers in 1960. Under this scheme farmers are loaned in-calf, heifers or cows and when female calves are born, these become the property of the farmers. By 1963 it was clear that more attention would have to be directed to increasing the area under pangola pasture and to pasture management if the livestock industry is to improve significantly in the immediate future.

In 1962 the first commercial specialised poultry farm was established in the island at L'ance Aux Epines in the dry southwest. At this unit over 25,000 birds are slaughtered annually and many thousand eggs are released through city groceries. Another large poultry farm was established at nearby Point Salines in 1963. Jointly these farms meet a fairly large share of the commercial requirements, and imports of whole chickens have decline. However, imports of cheap crops—backs and wings—have remained high.

Animal feeds and feeding also have received some attention from the Department subsequent on the establishment of a feed manufacturing plant at River Road, St. George's. This plant Grenada Local Products Ltd., produces stock and poultry feeds largely from local raw materials and sells the feeds at prices lower than those of imported concentrate feeds. The local feed was being tested in 1963 in trials involving hogs and poultry.

Rabies is a reportable disease that has been causing concern locally for some time. Six cases were reported in animals in 1960. The resevoir of infection is the mongoose and routine measures have failed to eradicate the disease. A team of W.H.O. experts visited Grenada in 1963 to investigate the problem and recommend to Government the eradication of the mongoose and control of stray dogs.

In 1960 a limited check was made to ascertain the prevalence of T.B. in local cattle. T.B. tests were made on 150 cows and three reacted positive No further tests were attempted.

Among the non-reportable diseases, Parasitism (round worm and ticks) and Ketosis pose the two biggest problems, the former representing about one-third of all non-surgical cases. A limited tick spraying programme was carried out in 1962.

In the sphere of imports and exports of animals and animal products, and ainmal quarantine, no serious problems were encountered during the four years being reviewed.

(g) FISHERIES

The survey of the fishing grounds begun in 1959 was pressed ahead with in 1960, 1961 and 1962. The Government fishing boat 'Daislyn" which had undergone major repairs in 1959 was used extensively for surveys of S.S.W. and S.E. coasts of Grenada and records were made of depth and type of sea floor as well as tide characteristics. Late in 1960 a survey was undertaken in the Grenada—St. Vincent Grenadines and a report was submitted to both Governments. Special mention was made of the productive lobster grounds found near Frigate Island, and Isle de Largo.

In 1961 the survey work of coastal fishing grounds was continued and a total of 185 trips were made exploring for new grounds and towing fishing boats that had no engines to and from productive areas. Three trips were made to Isle La Rhonde in 1961 transporting water to the inhabitants during the dry season. The Fisheries Officer and the crew of the Daislyn also made a trip to Carriacou and inspected the Cold Storage plant there. They also observed the method of cleaning, handling and storing fish at this plant.

In addition to surveying fishing grounds and rescuing distressed small craft, the Fisheries Division undertook numerous other duties. Loans were disbursed to fishermen under the Fisheries Rehabilitation Loan Scheme and repayments were collected when possible. However, many fishermen refused to repay loans and the Division seized nine boats and engines in 1960 and effected a couple of transfers in ownership. In 1961, fishermen returned seven engines and nine boats. One boat which was lost at sea was paid for by insurance.

The Division also checks and certifies duty free entries for marine engines purchased for use in fishing boats. Seven new engines were installed in 1960. Sixteen Certificates were issued for duty free engines in 1961 whereas in 1963, some twelve marine engines were loaded duty free.

Considerable attention was also given to turtles. A permanent crawl was built by Government at the Lagoon, St. George's, and in 1960 the Fisheries Division released one thousand turtle hatchlings received from the University of Florida, U.S.A. A further six hundred hatchlings were

received in 1961 and six hundred and fifty in 1963. After being fed and cared for three months, batches were released from various local beaches. The Division protected the turtle industry by patrolling beaches for turtle nets set during the closed season.

During the period reviewed the Fisheries Officer supported by the staff of the Co-operative Department made repeated efforts to organise fishermen into co-operative groups. Although at times it appeared that progress was being made, at the end of 1963 most of the groups had disintegrated.

Individually and in groups, the Division carried its extensive programme to fishermen. The care of tackle and servicing of marine engines received especial attention. Demonstrations featured the use of the Japanese Long Line for Tuna fishing and the Flying Fish Gill Net were made at all major fishing beaches in the period under review.

The Fisheries Division displayed fishing tackle including fish and lobster traps and the Japanese Long Line at the 1963 Exhibition in Queen's Park, St. George's. Later that year, in June, the division sponsored a Fisheries Week during which lectures, demonstrations and displays of new equipment were given in every parish.

SECTION V

CARRIACOU

Weather Conditions

Rainfall: In 1960 Carriacou faced its third consecutive droughty year and agriculture in general was adversely affected. Droughty conditions came to an end in early June 1961 when heavy showers were experienced. Returns in the table below substantiate reports that comparatively favourable rainfall was recorded in 1961 and 1962. In 1963 there was a decline in total annual rainfall and the pattern of precipitation was described as irregular, but on the whole suitable to most of the crops cultivated in Carriacou. Cotton yields, however, dropped sharply.

TABLE

STATION	YEAR			
	1960	1961	1962	1963
Belair ...	32.31	46.45	42.39	35.63
Craigston* ...	—	—	—	38.74
Dumfries ...	32.65	40.83	38.95	36.33
Limlair ...	21.96	38.08	37.42	37.26
Annual Average ...	28.97	41.79	39.59	36.99

* Recording started in September, 1962.

Under severe drought the whole island suffers but with moderate drought only the foodcrops in the south of the island fail. This differentiation indicates that a precipitation gradient exists and suggests the need for establishing a rainfall station in the south, perhaps at Harvey Vale School.

Windstorms: The drought of early 1960 was accompanied by high winds which stripped seed cotton from the trees. Soil erosion from the winds was quite evident. In April, 1963 heavy winds and high seas were experienced over a three day period, whereas in late September and early October, hurricane warnings were received. No damage occurred.

Fertiliser Importation

Fertiliser Importations: Investigation has shown that for many a recent year less than three tons of fertiliser was imported annually into an island with perhaps as much as 3,000 acres of crop and pasture land. By current Grenada levels of application, Carriacou should be using over 200 tons annually.

AGRICULTURAL PRODUCTION

Major Crops

Cotton: Except for the year 1963 when there was a drastic decline in cotton lint production, the production pattern for cotton has been dominated by moderate fluctuations. From 1954 to 1962 yields have varied between 780 and 1,685 cwts. Weather conditions alone cannot be blamed for the decline to 524 cwts exported in 1963.

TABLE

COTTON EXPORTS, 1954 to 1963

Year	Cotton Lint (Cwts)	Cotton Seed (Tons)
1954	1,182	184
1955	1,093	174
1956	780	117
1957	937	151
1958	1,075	170
1959	852	134
1960	1,288	195
1961	924	155
1962	1,685	275
1963	528	86

The Cotton Ginnery received 45 cents per pound for the lint which is sold to Trinidad.

In 1959 the price paid for seed cotton was 12 cents per pound. But from 1960 through 1963 only 10 cents was paid and numerous complaints about low prices were received in 1962. Reports indicated that the big drop in production of cotton in 1963 was mainly due to lack of labour, poor rainfall and the low price paid per pound for seed cotton.

As in the past, Carriacou's cotton seed for 1960-1963 was sold to a mill in Antigua and fetched $65.00 per ton. After 1963, seed cotton exports will be sold to neighbouring St. Vincent.

Limes: Lime has been the major permanent crop in Carriacou for some time and will probably continue to hold this paramount position for many years.

There are two lime factories, Dumfries and Craigston, for milling the limes to produce lime oil and lime juice for export.

TABLE

	1957	1958	1959/60	1960/61	1961/62	1962/63	1963/64
Lime Oil (lbs.)							
Dumfries	360	630	1,070	542	718	2,384*	780
Craigston	180	450	—	—	—	—	401
Lime Juice (Gal.)							
Craigston	—	—	23,182	2,010	9,958	5,767	—
Total $ Value	5,800	12,400	29,800	7,900	15,500	32,600	14,200

* Some of the increase was due to processing of limes from Grenada.

The lime crop was so battered and the factories so damaged by the 1955 hurricane that no processing was attempted in 1956. Figures in the above table show that limes in Carriacou are very sensitive to unfavourable weather conditions be it hurricane or severe drought. The immediate post hurricane crop of 1956 was not crushed. The value of lime products then rose sharply from $5,800 in 1957 to $29,800 for the 1959/60 crop. Next the drought of 1960 reduced the value of the 1960/61 crop to a mere $7,900 to be followed by another sharp increase to $32,600 for the 1962/63 crop. A reduction in rainfall in 1963 caused yet another sharp drop in the value of the lime crop to $14,200.

The overall picture is far from satisfactory as an *entrepreneur* can hardly be expected to make long term commitments to an industry whose fortunes fluctuate so drastically. It would appear that such agronomic techniques as mulching and fertilising should be tested on a large scale under typical field conditions in an effort to stop the lime trees from dropping most of their young limes during droughty conditions.

Coconuts: The programme of planting young coconut trees was continued in 1960 and 1961. Material was released from a nursery at Lauriston made up of selected nuts from St. Lucia. Grenada nuts were not used in an effort to avoid bringing in Red Ring Disease from the mainland territory. Some of the young trees made fair progress but due to destruction by livestock during "Let Go Season" (i.e. during the dry months, March to June, livestock are allowed to roam unchecked), farmers become reluctant to extend their coconut cultivations. Mature trees yielded fair crop by Carriacou standards but nuts tend to be small. Like all other crops in Carriacou, coconuts suffer from lack of fertilisers and from the ravages of livestock in the dry season. Coconuts, like lime, is a hardy drought-resistant crop, with an important role to play in Carriacou. As permanent crops they, along with pangola grass for livestock, offer a real solution to the island's soil conservation problems.

Food Crops

Corn: Corn is by far the most important foodcrop grown in Carriacou and is for human consumption. In years of good yields small quantities are fed to poultry, whereas the entire 1959 corn crops had been lost due to drought, only the southern part of the island lost its 1960 corn crop. Overall, the 1960 crop was moderate and bumper crops were realised in 1961 and 1962. However, particularly in 1961, some fields suffered from attacks by the corn ear worm, and blight. In 1963 reduced rainfall led to a failure of the crop in southern Carriacou, but as in 1960, a fair harvest was reaped in the rest of the island.

Pigeon peas—This popular legume is usually interplanted with corn and cotton and ranks second as a local foodcrop. The 1960 and 1963 crops were poor whereas fair crops were obtained in 1961 and 1962.

Other foodcrops—Only small quantities of yam, sweet potatoes and bluggo and cassava are grown and the island depends heavily on imports of starchy and green vegetables from Grenada and St. Vincent.

Other Imported Crops

Peanuts—Peanuts are produced in limited quantity, about 250 bags of 100 lbs. annually, for export to Grenada. Most of this crop is grown in the south of the island and overall production has been maintained despite a reduction in the total acreage planted.

LIVESTOCK AND PASTURES

Livestock rearing in particular cattle, sheep, goats and poultry, is important in Carriacou. Overstocking and the absence of stall feeding make it difficult to market finished animals. The Grenada market does not offer attractive enough prices and cattle are usually disposed elsewhere—Martinique in 1960, 1961 and 1962, and St. Lucia subsequently. As usual poultry was sold to Trinidad. Since the Trinidad and Tobago Government lifted its ban on other meat products (pork excluded) there has been a lively trade in sheep and goats with that territory. The animals for Trinidad are shipped via Grenville, Grenada.

Year	Cattle	Sheep	Goats	Poultry (mainly fowls)	Hogs & Donkeys	Turtles
1959	201	39	30	2,841	4	—
1960	300	27	41	2,842	3	—
1961	412	4	12	2,861	2	2
1962	344	—	4	2,819	2	3
1963	300	*	*	3,390	2	6

* From August 1963 considerable quantities of sheep and goats were shipped to Trinidad via Grenville, Grenada. The totals for the Joint Grenada/Carriacou exports are presented under the Livestock section of the Grenada portion of this report.

Pasture development has been receiving attention in recent years. Government, through the Department of Agriculture has been extending the acreage under pangola grass. From 1960 onwards there has been a steady increase in pangola acreage on Government owned commons. Most of these pastures are at Lauriston, Limlair, Dumfries, Brunswick, Harvey Vale and Belair. By 1963 about 60 acres have been planted and fenced and lack of funds halted the expansion. Some of the pastures have ponds which have been either made or cleaned by tractor. The pastures are opened when the grass is ready for grazing and in practice are grazed on about one month at a time. Farmers pay 50 cents per month per head for cattle and 15 cents each for sheep. In 1963 a total of 594 cattle and 135 sheep were grazed for short periods on the commons i.e. approximately 150 cows and 34 sheep for each of four separate monthly grazings.

Some farmers have been following the lead set by the Agricultural Department and have established their own. In 1961 about twenty farmers received aid in the form of grass plants, wire and fertiliser and planted about 11 acres. When the assistance ceased the planting programme lagged. Farmers definitely realise the need for improved pastures but the high cost of fencing has handicapped their efforts. A number of unsuccessful attempts were made of establishing Bermuda grass in Carriacou.

WORK IN THE DEPARTMENT

Extension Services

In Carriacou the Department of Agriculture is represented round the year only by members of the Extension staff. A senior Agricultural Assistant assisted by one Agricultural Instructor Grade I and two Agricultural Instructors, Grade II is responsible for programme implementation. Specialist officers, operating as extension specialists, visit Carriacou periodically. In addition, a Forest Guard and two Land Settlement Rangers of the Department of Forestry and Lands report to the Senior Agricultural Assistant in keeping with an informal arrangement between the two heads of Departments. There were several staff changes in the agricultural section during the period reviewed and as a result the programme suffered to some extent. The Senior Agricultural Assistant resides at Dumfries Estate and along with extension duties is Secretary to the Carriacou Land Settlement and Development Board. He is responsible for management of the Boards's estates at Dumfries and Lauriston as well as the lime oil factory at Dumfries.

Programme Planning. The Senior Agricultural Assistant to date has been largely responsible for both programme development and its implementation. The Agricultural Officer (General), who supervises the extension service, visits Carriacou about twice per year. In April 1962 an Extension Programme Planning Committee was established in Carriacou and has since assisted by drawing attention to some of the farmers' problems that need attention. As in Grenada, only Agricultural production and 4-H are directly embodied in the Extension Programme.

Production

Carriacou's extension education programme which among other things attempted to demonstrate to farmers the technique essential to increased production, relied considerably on individual farm visits. Other methods used included group activities such as youth and adult meetings, conducted tours, field days, and method demonstrations organised for groups. Some work was done with "Key Farmers" who were selected to function as informal leaders capable of setting exampes to less able farmers. Lack of funds to maintain assistance to key farmers and to established result demonstration plots limited staff's ability to emloy these two methods effectively. Again, mass media methods such as farm news programmes on the radio and in the local press, methods which are used with some success in Grenada, have much less significance in Carriacou.

Officers encouraged farmers to concentrate on the following activities: planting pangola grass, erecting fences, establishing vegetative and stone barriers on the contour, planting windbreaks and using more mulch and fertiliser. Attention was also given to promoting soil conserving crops such as coconuts, limes and improved grasses. Cotton and peanuts which encouraged erosion were not promoted as vigorously. Statistics show a steady decline in the annual number of farm visits reported from about 750 farms per annum to only 600 per annum over the period and is a cause for concern inspite of the cessation of Agricultural Rehabilitation loans and grants, the numerous changes in supervisory officers, and a shrinking number of able body male farmers arising out of the drift of families to the United Kingdom.

With obvious signs of advanced erosion ever visible, work on soil conservation has always been important in Carriacou. However, as the figures below show, planting of barriers, etc., has declined sharply, since 1960, with the stopping of financial assistance which has originated with Central Agricultural Rehabilitation Committee.

Type Protection		footage worked				
		1959	1960	1961	1962	1963
Drains	...	679	2,499	200	1,095	(not available)
Vegetative barriers	...	16,852	7,295	1,000	695	" "
Stone barriers	...	19,907	14,246	3,800	690	" "
Gully protection	...	100	200	—	2,000	" "

Soil Conservation grants and Agricultural Rehabilitation loans were maintained for the last time in the 1960 divisional report for Carriacou. In addition to the 1955 hurricane, Carriacou experienced two very droughty years, 1959 and 1960. The situation had become so serious that a food relief campaign organised in Grenada had to be maintained from late 1959 to early 1961. Free food and plant materials had to be brought into the island in substantial quantities to alleviate the near famine conditions. It is indeed unfortunate that no funds could have been spared for development immediately thereafter. The upswing in agricultural production in 1961 arose largely out of more favourable weather conditions just as the 1963 slump in cotton production largely reflected inadequate rainfall.

A tractor service which had been made available for hire to Carriacou farmers from the second quarter of 1959 was maintained throughout the period.

Year	No. of farmers using tractor service	No of hours tractor worked
1960	326	570½
1961	—	—
1962	151	156½
1963	157	332½

A fee of $10 per hour is charged. The tractor, a small crawler, has not been able to cope satisfactorily with the heavy work and poor maintenance to which it has been subjected. From 1960 onwards repeated breakdowns have limited the hours of operation. Work done included ploughing, subsoiling, bulldozing, cutting roads, opening ponds, cleaning ponds, and assisting with launching large inter-island schooners built on local beaches.

Budded limes form the bulk of plants distributed in Carriacou. Distribution through the extension staff not only provides an essential service to farmers but promotes and increases individual contacts between farmers and officers.

Type of Plants	No. of Plants Distributed				
	1959	1960	1961	1962	1963
Budded Limes	5,325	3,377	4,453	(n.a.)	1,478
Citrus other than limes	515	—	412	253	250

Coconuts	2,505	200	—	—	—
Mangoes	1,075	80	120	—	—
Clones	125	—	—	—	—
Pimento	300	—	—	—	—
Sapodilla	300	—	495	—	—
Sugar Apple	400	—	200	2	—
Breadfruit	309	—	—	—	—
Breadnut	100	—	—	7	—
Bluggoe	—	—	353	546	100
Pineapple	200	—	—	—	—
Avocado Pear	—	40	—	—	—
W. I. Cherry	—	—	200	—	—
Sweet potato slips (bags)	—	300	8	3	—
(Casava (bundles)	—	—	36	—	38
Cane Plants (bundles)	—	—	4	—	10
Guatamela Grass (bundles)	—	—	30	—	—
Pangola grass (bags)	—	50	*	*	*
Miscellaneous	214	—	100	—	—

* Pangola distributed from permanently established fields in Carriacou.

The table above shows a big decline in the number of plants distributed in 1960 as against 1959. Two factors caused the drop—the drying up of Rehabilitation funds and the severe 1960 drought which convinced all concerned that transplants would not survive. There was a small increase in plants distributed in 1961 over 1960 and then on—other decline reflecting further curtailment of the propagation programme in the Grenada nurseries due to restricted funds. Plants were formerly delivered free. From 1961 plants were sold at 12 cents each and for 1962 and 1963 the charge was 15 cents per plant. These nominal charges were made to offset transport costs.

All budded limes for Carriacou originated from Government nurseries in Grenada. Many of the very limited number of lime plants delivered die if droughty weather steps in earlier than anticipated.

Livestock is a very important sector of agricultural production in Carriacou and in 1961 artificial insemination was introduced to help improve the quantity of cattle. Whereas in Grenada the artificial insemination service is supplied by a Veterinary Assistant, in Carriacou an Agricultural Instructor trained to perform the service must always be on call. Although there remains much room for improving quality, the indications are that real progress has been made in recent years. It should be noted, however, that there are no restrictions on the export of quality breeding stock and there is a steady outflow of good heifers sold to St. Lucian farmers.

At first, liquid semen was shipped twice weekly in vacuum flasks packed with ice. Later in 1961, a metal "bull barn" was supplied and frozen semen from proven bulls in Canada and the U.K. was made available. Due to a number of difficulties the service was not offered for six months in 1962 commencing in March. On resumption of the service, a return was made to liquid semen in preference to frozen semen.

In 1961 some 25 first and 13 repeat services were done. Many farmers adopted a wait and see policy and kept using local bulls.

Contary to the Grenada experiences, the Revolving Herd Scheme has played a very minor role in Carriacou. Only two cows were made available to farmers under the scheme and one of these proved a difficult breeder and had to be sold. The other animal had delivered three calves, one heifer and two bulls, during the period 1960—1963.

The extension staff assisted livestock farmers with castrations and minor surgery for all classes of livestock. Annually about 50 castrations and 40 sick animals were treated exclusive of animals on government stations. Parasitism,(worms) received considerable attention. Prolapse of the uterus was a fairly common ailment during the dry seasons.

Carriacouans participated in the big agricultural and industrial fairs held in St. George's, Grenada, in 1960 and 1963 and won numerous prizes. However, on both occasions transport difficulties made it impossible for them to compete in the livestock sections. The Extension Service gave valuable assistance in selecting, preparing and presenting farmers' exhibits.

The newly formed local Extension Programme Planning Committee co-operated with the Department of Agriculture in organising and judging entries in the 1962 Farm Competition. Large numbers of entries were received in the following classes: Corn, pigeon peas, limes, cotton, and pangola grass. Yam entries, however, were disappointing.

Marketing in 1960 was handled almost solely by female hucksters in the market place at Hillsborough. In 1961 the Food Storage Centre in Grenada expanded its services in Carriacou and the part-time attendant at the Hillsborough Food Storage Centre was replaced by a full-time clerk who was responsible both for sales and keeping accounts. Sizeable quantities of ground provisions and fruit as well as livestock feeds embodying local corn, and coconut meal and molasses from Grenada, were stocked.

Established on a trial basis, the new marketing outlet had definitely met a felt need. But in 1962 problems related to the purchase and storage of corn led to a discontinuation of the sale of animal feeds. The sale of vegetables and fruit was maintained into early 1963 when the trial scheme was terminated.

4—H Work

4—H was started in Carriacou in 1959 with the organisation of a Club at Dover Model School. Three new Clubs were started in 1960—L'Esterre, Mt. Pleasant and Hillsborough. In 1961 five new Clubs were established—Six Roads Boys, Six Roads Girls, L'Esterre Senior, Harvey Vale Junior, and Harvey Vale Senior. The year was a good one for 4—H. Training courses for leaders were held both in Grenada and in Carriacou. Projects for the youths included sewing, handicrafts mainly with straw, pangola grass plots, poultry and other livestock, and vegetable gardening. Inter-Club competitions were run for corn plots and a trophy was offered to the winning Club. Clubs continue to compete for this trophy annually. 4—Hers enjoyed another successful year in 1962 and 10 Clubs were functioning, but some did not complete initiation ceremonies. There were further training courses for leaders.

In 1963 a fair level of activity was evident. In addition to participating in individual and Club projects, youth enjoyed keen competition in recreational activities, mainly cricket, netball and some table tennis. However, there was a steady loss of leaders and youths migrating to the U.K. and the movement suffered.

Home Economics

Two Home Economics groups, one at Hillsborough and the other at Harvey Vale, were organised by the Grenada Nutrition Committee. Although these groups were formed with the Extension Service their value to farm familes was recognised and officers of the Agricultural Extension Service attended meetings and assisted generally. In Carriacou, the Extension Service has had little success with organising farmers' Clubs for adult males and experience with the home economics groups should prove of value.

LIMLAIR AGRICULTURAL STATION

Crops: About 7—8 acres on the station were planted annually to small plots of yam, sweet potato, cassava pigeon peas, blackeye peas, corn, pumpkin, tomato, cane, cotton, and peanuts. A majority but not all of these crops were planted in any single year. In 1960 which was a droughty year, corn, pigeon peas and peanuts yielded satisfactorily, but the other crops failed. All crops yielded fair in 1961, 1962 and 1963.

To allow for observing the performance of various crops, a pilot project was started in 1961. It occupies about three acres of station land and is still in progress. Crops under observation are mangoes, citrus, sugar apple, sugarcane, cotton and pigeon peas.

Numerous cultural practices including silt pits, dikes, bench terraces and contour stripping have been included.

Pastures:—The Pangola pastures at Limlair Station were extended gradually over the period reviewed.

Livestock:—As in the past, a stud centre was maintained at Limlair throughout the period. In April, 1961, a second stud centre was opened—this at Dumfries Estate.

Services at Limlair Station and Dumfries Estate

Year	Bulls	Bucks	Rams	Boars	Total
1959*	65	—	—	32	97
1960*	84	—	5	38	127
1961	52	16	2	50	118
1962	58	6	16	44	124
1963	38	—	24	39	100

* Figures for Limlair only, the Dumfries centre was opened in April, 1961.

Eleven Black Headed Persian—six rams and 5 ewes—were transferred from Grenada to Limlair Station in 1961. The animals have adapted well.

Under the original Poultry Multiplication Scheme a pen of about twelve Rhode Island Red birds was maintained at Limlair. In 1959 and 1960, some 2,559 and 1,269 eggs respectively were collected and sold. However, it had become evident that the eggs were being used for domestic purposes and not for hatching. As a result the birds were sold and in 1961 and thereafter week-old chicks were shipped from Grenada to meet specific orders from farmers.

The number of deaths of all classes of livestock at Limlair Station is given below:—

Year	Deaths
1959	7
1960	11
1961	4
1962	4
1963	2

On 31st December, 1963, Livestock at Limlair Station were:—

Bulls	...	1	Bucks	...	1
Cows	...	2	Rams	...	6
Bullcalf	...	—	Ewes	...	6
Heifers	...	2	Male Lamb	...	1
Boars	...	3	Female Lambs		3
Sow	...	1	Steer	...	1

SECTION VI

STAFF OF THE DEPARTMENT OF AGRICULTURE (1963)

A.—TECHNICAL

1.—Head Office

G. A. Southwell, D.I.C.TA.	...	Superintendent of Agriculture
E Payne, B.S.A., M.S.	...	Agricultural Officer (General)
E. M. A. Welsh	...	4-H Organiser
W. E. Bain	...	Agricultural Information Officer

2 Extension Districts

K. I. Rush, Dip., E.C.F.I.	...	Acting Senior Agricultural Assistant
G. A. Phillips, Dip. Agric. O.A.C.	...	Agricultural Assistant
R. Buckmire, D.I.C.T.A.	...	" "
R. F. Edwards, Dip. E.C.F.I.	...	Acting Agricultural Assistant
M. John, Dip. E.C.F.I,	...	" " "

Agricultural Instructors

M. Wilson, Dip. E.C.F.I.
L. Sayers, Dip. E.C.F.I.
N. Knight, Dip. E.C.F.I.
C. Garrett
C. Mitchell
C. Alexander
O. Campbell
L. Grenade
D. Hosten
O. Charles
J. Marrast
H. Stevenson
M. Gilbert
C. D. Augustine
L. Cruickshank
K. Shears
E. Noel—Died January, 1963
R. Noel (Temporary)
N. Bain (Temporary)
C. Hope (Temporary)
J. Hercules (Temporary)
C. James (Temporary)
S. Law)
M. A. Regis) on Study Leave at E.C.F.I.
O. Charles)
J. Telesford)

3. Cocoa Industry Improvement Scheme

D. A. Perryman, D.I.C.T.A.	...	Cocoa Agronomist (Seconded to WINBAN as General Manager, February, 1960)
A. M. Cruickshank, M.Sc., D.I.C.T.A.	...	Cocoa Agronomist
D. O. Rennie, Dip. E.C.F.I., D.I.C.T.A.		Agricultural Officer (cocoa)
N. D. Nedd, Dip. E.C.F.I.	...	Agricultural Assistant—Officer-in-Charge, Maran Cocoa Station
B. A. Pitt, Dip. E.C.F.I.	...	Agricultural Assistant—Officer-in-Charge, Ashenden Cocoa Station

R. Mark, Dip. E.C.F.I.	...	Field Assistant
I. Ferreira	...	Senior Field Assistant—Officer-in-Charge, Mirabeau Agricultural Station
R. L. Benjamin	...	Field Assistant, Nutmeg Propagation
O. John	...	Field Assistant, Mirabeau Agricultural Station
J. Marshall	...	Foreman, Maran Cocoa Station
O. Lycorish	...	Junior Field Assistant, Mt. Horne Cocoa Station
M. Peters	...	Junior Field Assistant, Mt. Horne Cocoa Station
P. J. Francis	...	Propagator Attendant, Boulogne Cocoa Station
R. George	...	Propagator Attendant, Ashenden Cocoa Station
J. Hercules	...	Propagator Attendant, Maran (Transferred to Extension Staff).
V. Grey	...	Acting Propagator Attendant, Maran
L. Parkes	...	Mechanic, till 1st June, 1963.
D. Weekes	...	Mechanic, from 1st July, 1963

4.—Plant Protection

G. L. Ogilvie, Dip. E.C.F.I.	...	Plant Protection Officer
L. Raeburn	...	Senior Plant Disease Inspector
J. Leid	...	do do
S. Kent	...	Plant Disease Inspector
N. Creft	...	do do
B. A. Calliste	...	do do
A. C. G. Fletcher, Dip. E.C.F.I.	...	do do
W. Sawney	...	do do
R. Pierre	...	do do
A. LaTouche	...	do do
C. Dominique, Dip. E.C.F.I.	...	do do
D. Mitchell	...	Acting Plant Disease Insepctor
L. Kent	...	do do do
H. Carter	...	do do do

5.—Veterinary and Livestock

E. C. Arthur, B.Sc., D.V.M., V.S.	...	Veterinary Officer
E. John, Dip. Agriculture. O.A.C.	...	Livestock Officer (on leave)
E. O. Barrett, Dip. J.S.A.	...	Acting Livestock Officer
A. Gittens	...	Technical Assistant
D. McLeish, Dip. E.C.F.I.	...	do do

6.—Banana

A. C. Branch, Dip. E.C.F.I.	...	Acting Banana Officer

7.—Cane

D. B. Louisey, Dip. E.C.F.I.	...	Cane Farming Officer (on secondment from Co-operative Department)

8.—Land Use

D. S. O. Noel, D.I.C.T.A.	...	Land Use Officer
C. H. Francis	...	Land Use Assistant

9.—Fisheries

N. M. Greaves	...	Fishery Officer

10.—Marketing

N. James	...	Marketing Officer
B. Hamilton	...	Produce Inspector
C. Campbell	...	do do

11.—Botanic Gardens

N. Burris	...	Field Assistant, Horticulture
W. Marshall	...	Foreman

12.—Agricultural Stations

J. Carter	... ...	General Foreman, Westerhall Agricultural Station
C. Wise	... ...	Livestock Foreman, Westerhall Agricultural Station
J. Bonaparte	... ...	Foreman/Stockman, Mt. Moritz Agricultural Station
S. Jones	... ...	Foreman/Stockman, Tivoli Agricultural Station

B.—CLERICAL

1.—Head Office

O. T. Buxo	... ...	Office Superintendent
S. St. Louis	... ...	Class II Clerk, Votes
A. Glean	... ...	do do
C. Vincent	... ...	do do
L. Antoine	... ...	do do
L. Chasteau	... ...	do do
D. Alexander	... ...	do do
O. La Touche	... ...	Clerical Assistant
M. Charles	... ...	Store Keeper
L. Browne	... ...	Office Messenger
D. Griffith	... ...	Truck Driver

2.—Out Offices

Cocoa Industry Improvement Scheme

E. N. Barriteau	... ...	Class I Clerk
K. J. Nedd	... ...	Class II Clerk, Votes
R. J. Edwards	... ...	do do
N. S. Taylor	... ...	do do
G. Charles	... ...	Assistant Clerk
D. Paul	... ...	do do
G. Taylor	... ...	do do
H. Flanders	... ...	do do
A. Reuben	... ...	Typist

Agricultural Stations

H. John	... ...	Clerical Assistant till September
M. Bernard	... ...	Clerical Assistant from October
L. Campbell	... ...	Clerical Assistant till November

Marketing Organisations

B. Steele	... ...	Clerk—Storekeeper
A. Cobb	... ...	Assistant Storekeeper

MONTHLY AND ANNUAL RAINFALL RETURNS—1960

No.	Observation Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Maximum in one day and date		No. of days on which rain fell
1	Annandale Estate ...	4.34	3.19	4.90	4.15	3.35	15.34	13.49	21.07	9.50	17.97	8.96	4.62	110.88	June 23rd	3.52	192
2	Ashenden Cocoa ...	3.30	2.14	1.82	3.50	3.49	10.01	8.69	14.48	12.38	6.33	7.11	4.61	77.86	August 24th	2.47	239
3	Bailies Bacolet Estate	2.89	1.41	1.42	2.14	1.55	6.95	5.31	10.91	4.79	9.15	6.37	2.05	54.94	August 24th	2.76	—
4	Balthazar Estate ...	1.99	1.20	1.50	3.00	1.23	11.36	4.31	15.45	4.68	15.22	5.22	4.24	69.50	June 8th	3.25	94
5	Belvidere Estate ...	4.73	3.92	4.04	4.48	4.96	14.08	9.51	20.91	10.30	19.81	11.26	7.70	115.70	August 24th	4.83	260
6	Belair Park, Carriacou	1.00	1.59	1.00	0.22	0.82	4.90	4.92	7.13	1.11	3.90	1.72	2.93	31.24	July 11th	2.78	92
7	Botanic Gardens ...	1.40	1.20	1.38	1.49	2.26	7.32	6.59	11.70	4.85	12.01	6.82	2.36	59.38	August 24th	2.49	161
8	Blair Athol Estate	2.90	1.70	1.18	0.99	3.34	9.59	5.12	12.66	5.14	10.07	6.34	5.22	64.25	June 9th	4.82	169
9	Boulogne Cocoa Station	2.62	2.10	0.88	1.91	2.34	10.96	4.84	12.74	6.62	11.81	5.71	4.32	66.85	June 8th	3.66	214
10	Brothers Estate ...	4.11	2.06	2.31	3.81	3.66	13.63	10.69	22.32	8.08	12.38	8.94	7.26	99.25	August 24th	2.79	217
11	Calivigny Estate ...	1.59	0.65	1.24	1.77	1.70	5.42	7.14	—	4.42	8.02	4.25	2.08	—	—	—	—
12	Calliste Estate ...	0.64	0.45	1.01	1.34	0.27	3.00	4.35	7.39	2.77	5.91	3.16	1.94	32.23	August 13th	2.05	158
13	Crayfish Estate ...	1.92	2.18	1.59	1.50	3.62	10.34	6.94	15.38	5.95	10.64	6.21	4.47	70.94	June 8th	4.06	225
14	Dougladston Estate	3.33	1.59	1.99	3.09	2.59	14.42	9.40	24.55	8.42	11.84	9.84	6.82	97.88	August 24th	5.11	195
15	Dumfries Estate, C'cou	1.57	0.52	0.97	0.50	0.96	5.59	4.62	4.24	2.06	5.48	2.17	3.65	32.33	December 6th	2.48	106
16	Dunfermline Estate	2.25	1.12	0.82	1.49	1.73	9.57	3.36	11.68	6.17	12.12	4.09	3.30	57.70	October 24th	2.40	111
17	Grand Bacolet Estate	3.09	1.35	1.95	1.55	2.86	9.14	8.59	10.74	8.69	12.85	5.15	3.44	69.90	June 9th	2.53	221
18	Hope Vale Estate	2.34	1.43	2.10	1.80	2.06	6.81	6.82	—	3.51	10.98	6.49	2.87	—	—	—	—
19	L'Anse Aux Epines	0.98	—	0.72	1.04	0.30	4.50	4.69	8.55	2.25	6.45	3.92	2.04	—	—	—	—
20	LaSagess Estate ...	3.06	1.07	1.13	1.91	1.64	7.38	6.44	10.29	4.23	10.01	5.85	2.45	55.46	August 25th	2.30	143
21	Les Avocats Water Works	3.97	2.74	3.34	3.71	5.78	10.65	8.69	15.97	7.90	17.51	10.35	4.98	94.96	June 24th	3.00	228
22	Limlair Agricultural Station, Carriacou	1.75	0.53	0.77	0.21	0.69	4.19	3.73	5.64	0.70	3.60	1.60	2.47	25.88	August 11th	1.88	—
23	Lower Marli Estate	2.62	2.51	1.09	1.29	2.75	9.75	4.63	12.95	5.34	7.10	3.90	3.58	57.51	June 8th	5.30	172
24	Maran Cocoa Station	2.80	2.68	2.56	2.27	2.71	12.02	9.59	21.55	7.85	8.96	7.70	5.83	86.52	August 10th	2.69	256
25	Mirabeau Agricultural Station ...	2.60	1.82	2.08	2.13	2.37	11.05	4.73	14.56	8.13	13.04	5.86	4.18	72.55	August 24th	3.12	—
26	Mt Horne Cocoa Station	2.50	1.42	1.83	0.72	2.46	10.92	4.66	16.14	6.72	12.41	6.28	3.70	69.76	June 7th	3.40	—
27	Mt. Moritz Agricultural Station ...	1.89	0.69	2.52	2.00	2.05	11.11	6.76	18.67	4.29	12.32	8.28	1.76	72.34	June 23rd	2.00	156
28	Samaritan Estate	2.57	2.13	1.66	1.31	3.91	8.99	6.16	12.94	5.49	10.06	7.01	5.95	68.18	June 8th	2.65	220
29	Tivoli Agricultural Station	1.95	2.73	3.54	1.74	3.15	9.26	5.12	11.03	3.50	6.46	3.64	3.91	56.03	—	—	—
30	The Park Estate ...	2.67	1.10	2.32	3.61	3.94	8.88	5.88	13.58	5.89	14.59	7.12	4.42	74.00	October 22nd	1.94	193
31	Tufton Hall Estate	4.86	4.54	2.89	3.99	5.01	12.21	10.53	19.08	8.62	13.58	10.09	8.93	104.33	October 22nd	2.75	—
32	Upper Marli Estate	2.88	2.06	1.55	1.46	3.54	10.35	6.46	12.25	4.16	9.77	6.09	4.66	65.23	June 8th	4.61	221
33	Westerhall Agricultural Station ...	1.91	1.03	1.40	1.81	1.79	5.88	5.89	9.73	4.64	8.24	4.89	2.69	49.90	August 24th	2.95	178

No.	Observation Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Maximum in one day and date		No. of days on which rain fell
1	Annandale Estate ...	4.34	5.06	1.72	2.39	4.15	12.49	14.68	14.66	10.91	20.72	13.98	9.66	114.76	October 12th	6.35	199
2	Ashenden Cocoa Station ...	6.41	3.09	1.72	1.98	2.04	7.71	13.39	12.37	5.43	18.45	10.73	9.05	92.37	October 12th	3.89	—
3	Bailles Bacolet Estate ...	5.63	2.17	0.90	1.25	1.66	4.82	9.35	8.81	5.32	9.40	7.05	5.62	61.98	October 12th	2.53	190
4	Belvidere Estate	8.87	5.96	3.25	3.26	3.20	7.79	19.76	16.84	11.14	23.64	—	9.95	—	—	—	—
5	Belair Park, Carriacou ...	2.37	1.83	1.21	0.00	0.17	3.45	4.78	7.50	3.97	8.18	8.99	4.98	47.43	November 16th	3.50	144
6	Botanic Gardens	5.94	2.02	0.56	1.10	1.13	5.20	8.93	9.74	3.74	16.63	10.21	3.95	69.15	October 12th	7.70	129
7	Boulonge Cocoa Station ...	5.36	2.19	1.70	1.76	0.89	4.29	11.71	11.83	6.57	9.72	11.97	4.27	72.26	August 31st	2.77	231
8	Brethers Estate	9.04	4.56	2.47	2.21	3.23	7.71	19.73	17.26	8.56	17.81	17.69	8.07	118.34	October 12th	3.44	239
9	Calivigny Estate	5.51	2.08	0.76	0.94	1.11	5.38	9.08	7.87	—	5.84	6.54	5.41	—	—	—	—
10	Calliste Estate	2.54	0.87	0.18	0.26	0.43	3.50	6.55	4.53	4.54	7.23	6.13	3.09	39.85	October 13th	3.83	192
11	Crayfish Estate	5.59	3.20	1.58	2.36	2.58	5.56	14.48	15.60	6.81	14.26	13.02	4.09	89.13	July 19th	4.20	246
12	Dougaldston Estate ...	8.63	3.26	1.73	2.03	3.02	7.42	19.13	17.82	8.27	21.47	15.98	8.11	116.87	October 6th	4.23	236
13	Dumfries, Carriacou ...	2.65	1.59	2.65	0.20	1.31	3.27	3.85	4.99	3.04	4.40	8.59	4.29	40.83	November 17th	2.12	107
14	Dunfermline Estate ...	4.03	1.40	1.27	0.93	0.49	3.51	13.89	10.25	5.59	8.40	9.82	1.94	61.52	August 31st	3.00	119
15	Grand Bacolet Estate ...	5.08	2.32	0.86	2.20	1.45	6.13	12.04	11.70	9.25	13.21	9.12	5.69	79.05	October 12th	2.28	227
16	Hope Vale Estate ...	5.87	2.23	0.57	1.48	1.28	6.28	9.20	8.83	5.27	10.32	7.74	6.59	65.66	October 12th	3.59	—
17	L'Anse Aux Epines ...	3.17	0.65	0.25	0.88	0.55	4.47	10.04	7.39	4.61	8.59	10.60	5.44	56.64	October 13th	4.40	163
18	LaSegesse Estate	4.17	1.58	0.78	1.02	0.64	4.72	7.75	9.09	5.78	8.40	6.23	4.53	54.69	October 9th	2.14	183
19	Les Avocats Water Works ...	7.48	3.25	1.45	2.90	2.11	11.53	21.28	12.68	10.86	23.58	11.53	8.62	117.27	October 13th	10.00	188
20	Limlair Agricultural Station, Carriacou ...	0.86	0.80	0.60	0.10	0.85	2.22	4.69	6.38	3.24	7.09	7.98	3.27	38.08	November 16th	2.75	93
21	Lower Marli Estate ...	3.82	1.87	1.76	1.45	0.77	3.84	9.06	11.41	5.43	13.34	10.59	3.46	66.80	October 13th	3.40	207
22	Maran Cocoa Station ...	8.49	3.71	1.71	2.25	2.62	7.64	17.55	16.33	7.92	13.95	14.72	5.64	102.53	October 12th	3.59	284
23	Mirabeau Agricultural Station	5.67	2.65	2.00	1.92	1.78	5.81	15.00	14.56	9.67	17.06	13.27	6.04	95.43	October 9th	3.75	211
24	Mt. Alexander Estate ...	3.39	2.47	1.24	0.99	0.62	4.03	9.41	8.79	7.90	15.57	12.41	—	—	—	—	—
25	Mt. Horne Cocoa Station	6.14	2.29	1.93	0.83	0.85	3.61	14.91	9.63	6.94	9.94	9.25	3.88	70.20	November 23rd	2.90	152
26	Mt. Moritz Agricultural Station	6.68	2.80	0.61	1.83	1.62	7.83	9.86	10.58	5.18	15.37	8.61	5.10	76.07	October 12th	5.65	232
27	Nianganfoix Estate ...	—	3.41	4.54	3.02	1.71	5.56	—	7.39	11.48	21.45	14.02	5.93	—	—	—	—
28	Pomme Rose Water Works	3.68	1.70	0.62	2.60	0.83	7.74	11.66	9.02	4.86	14.88	5.09	7.60	70.28	—	—	—
29	Samaritan Estate ...	5.54	2.54	1.95	1.77	1.48	5.13	12.89	12.28	6.36	12.27	14.56	6.25	83.02	July 19th	2.05	246
30	The Park Estate	6.87	3.39	0.98	2.22	1.92	7.17	12.43	10.43	5.45	14.80	6.68	10.89	83.23	October 12th	6.73	245
31	Tufton Hall Estate ...	9.68	5.35	2.17	4.20	2.50	7.87	18.56	14.60	12.30	18.68	18.97	8.09	122.97	October 12th	4.05	279
32	Upper Marli Estate ...	4.58	2.48	1.58	1.65	1.53	4.82	12.21	13.09	5.26	13.65	12.71	5.19	78.75	October 12th	4.76	243
33	Westerhall Agricultural Station	5.27	2.25	0.67	1.34	1.22	5.11	8.31	7.72	6.18	8.06	6.11	5.55	57.79	October 12th	1.91	200

MONTHLY AND ANNUAL RAINFALL RETURNS—1962

No.	Observation Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Maximum in one day and date		No. of days on which rain fell
1	Annandale Estate ..	11.68	8.16	0.72	4.08	4.07	24.84	12.54	17.78	12.81	16.20	15.53	6.69	135.10	November 18th	4.46	219
2	Ashenden Cocoa Station ..	8.67	7.05	0.89	3.34	4.09	20.39	8.15	13.38	7.80	7.75	10.20	7.62	99.39	June 25th	6.18	230
3	Bailles Bacolet Estate ..	4.83	3.47	0.36	1.43	2.24	18.92	7.19	10.39	6.18	7.68	6.60	5.37	74.07	June 25th	5.18	—
4	Balthazar Estate	6.28	4.36	—	1.20	1.73	17.47	9.30	10.64	11.05	4.68	8.16	5.91	—	—	—	—
5	Belvidere Estate	12.56	8.27	1.46	2.88	2.80	23.40	11.90	18.13	16.14	11.87	15.88	9.29	134.70	June 25th	4.22	252
6	Belair Park, Carriacou ...	4.98	1.78	0.70	0.20	0.27	5.57	7.03	6.00	7.63	5.13	1.25	1.81	42.39	September 9th	2.21	—
7	Blair Athol Estate ..	6.18	3.95	0.82	0.25	0.58	14.18	8.20	7.12	9.80	5.14	5.43	6.44	58.07	June 26th	2.57	172
8	Botanic Gardens ...	5.21	3.39	0.09	1.70	1.62	14.81	7.65	10.56	4.12	6.23	6.87	3.88	65.59	June 25th	3.25	135
9	Boulogne Cocoa Station ..	6.08	4.19	0.80	0.55	1.24	15.32	7.34	9.36	9.82	6.05	8.81	6.72	76.34	June 25th	3.00	200
10	Brothers Estate	9.56	6.49	1.10	1.88	1.51	21.30	10.27	18.20	14.60	9.95	11.49	6.90	113.13	June 25th	5.33	259
11	Calivigny Estate	3.66	3.49	0.13	1.79	3.80	15.11	6.75	—	6.99	4.08	7.13	3.94	—	—	—	—
12	Calliste Estate	2.20	1.50	0.02	0.58	0.19	7.87	5.53	3.94	6.23	2.15	3.88	2.04	36.29	June 26th	1.75	191
13	Crayfish Estate	5.97	4.02	1.10	0.83	0.53	17.30	6.57	10.46	9.53	7.64	7.51	6.47	77.94	June 25th	3.33	224
14	Dougaldston Estate ...	8.93	5.23	0.8	2.17	0.72	21.18	10.41	18.72	17.48	6.69	12.84	7.39	112.57	June 25th	4.81	206
15	Dumfries, Carriacou ..	—	1.36	—	0.11	0.69	5.84	4.50	5.56	5.99	5.79	2.45	2.37	38.95	October 14th	2.37	—
16	Dunfermline Estate ..	7.26	3.19	—	0.43	0.99	15.30	3.96	7.93	9.88	4.82	7.87	5.41	—	—	—	—
17	Grand Bacolet Estate ...	5.09	4.47	1.56	1.76	2.15	19.64	7.87	8.19	11.01	7.52	8.05	7.48	84.82	June 25th	4.35	249
18	Grand Etang House ...	13.71	7.83	1.73	4.42	3.73	18.38	13.95	13.87	15.54	15.84	16.79	9.53	135.32	November 19th	4.53	283
19	Hope Vale Estate ...	5.98	4.55	0.30	1.60	1.97	18.13	6.68	9.80	4.77	6.25	7.11	5.08	81.25	June 25th	5.09	204
20	L'Ance Aux Epines ...	2.50	1.54	0.23	0.96	2.45	10.22	6.63	5.83	5.76	3.37	6.97	3.16	47.60	November 19th	2.55	134
21	LaSagesse Estate	5.34	3.47	0.35	1.98	1.57	18.65	7.08	11.24	6.42	—	7.91	4.93	—	—	—	—
22	Les Avocats Water Works ...	11.79	8.36	0.97	4.20	2.78	20.43	9.57	14.59	9.21	12.91	13.30	—	—	—	—	—
23	Limlair Agricultural Station, Carriacou ...	4.37	1.35	0.47	0.07	0.08	5.26	6.61	6.09	7.75	5.15	0.99	1.33	35.52	September 9th	2.10	119
24	Lower Marli Estate ...	5.01	3.23	1.32	0.08	0.23	12.27	4.37	6.65	8.43	4.62	3.52	5.47	55.16	June 25th	2.12	173
25	Maran Cocoa Station ...	6.99	5.62	0.97	1.57	1.70	18.71	8.85	15.33	12.96	7.31	10.13	6.23	96.37	June 25th	4.85	269
26	Mirabeau Agric. Station ...	8.12	6.15	0.64	1.24	1.65	21.46	8.43	10.90	12.89	8.14	10.07	7.06	96.75	June 25th	4.12	232
27	Mt. Alexander Estate ...	5.38	5.07	1.39	0.00	0.19	9.70	7.11	7.04	8.65	7.06	3.66	—	—	June 26th	2.31	—
28	Mt. Horne Cocoa Station ...	4.87	3.60	0.59	0.68	1.67	10.45	7.00	9.35	7.96	4.65	8.21	6.88	65.91	June 9th	3.44	—
29	Mt Moritz Agricultural Station	5.77	3.72	0.13	2.57	2.61	14.07	6.24	2.87	6.93	8.55	7.55	4.33	65.34	June 25th	3.75	177
30	Pomme Rose Water Works	8.86	4.56	1.01	1.91	2.30	12.96	3.29	9.58	11.31	—	5.31	4.02	—	—	—	—
31	Richmond Hill Water Works	5.59	3.66	0.05	2.72	1.79	15.37	7.13	7.91	5.16	8.64	7.44	—	—	—	—	—
32	Samaritan Estate ...	6.01	3.74	1.31	0.85	0.58	15.18	7.79	10.00	9.81	5.67	7.95	7.16	75.57	June 10th	2.23	222
33	Simone Estate	6.85	3.57	0.08	0.66	1.24	14.93	6.06	9.10	8.54	4.14	7.97	4.65	67.79	June 26th	2.58	157
34	The Park Estate	8.18	5.35	0.77	3.97	2.26	14.81	7.18	11.36	7.42	6.09	12.22	5.87	85.48	November 19th	4.30	244
35	Tivoli Agric. Station ...	4.71	3.74	0.38	0.09	0.65	12.76	5.97	6.00	10.20	6.40	7.95	5.71	64.57	November 19th	2.84	160
36	Tufton Hall Estate ...	10.98	7.60	1.86	2.42	0.93	22.52	10.27	12.87	14.84	10.23	13.63	8.76	116.91	June 25th	5.76	244
37	Upper Marli Estate ...	5.18	3.50	0.91	0.32	0.50	13.13	6.55	7.59	8.19	5.91	6.19	6.41	64.37	June 21st	2.30	214
38	Vendomme Water Works ...	13.68	6.71	1.11	4.62	1.82	24.46	10.13	14.07	10.92	15.35	16.74	—	—	June 26th	8.04	—
39	Westerhall Agric. Station ...	3.88	2.50	0.06	0.70	2.35	15.36	6.75	8.31	6.04	5.12	5.57	4.44	61.08	June 25th	4.25	190
40	Woodlands Estate ...	4.59	3.59	0.18	1.46	1.36	15.97	6.60	8.05	5.43	5.05	5.75	—	—	—	—	—

No.	Observation Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Maximum in one day and date		No. of days on which rain fell
1	Ashenden Cocoa Station ...	5.68	2.72	2.87	2.49	13.15	6.02	8.29	6.45	14.41	3.27	9.64	9.70	84.69	September 30th	3.56	233
2	Bailles Bacolet Estate ...	2.73	1.52	2.02	1.69	7.67	7.43	6.60	7.77	11.49	2.48	8.40	8.05	67.85	September 30th	3.80	199
3	Balthazar Estate	2.80	2.98	2.00	3.05	12.25	6.97	—	3.86	6.49	4.90	7.85	4.95	—	—	—	—
4	Belair Park, Carriacou ...	2.22	1.52	1.43	1.00	3.09	4.81	4.94	2.90	2.86	1.85	4.76	3.25	34.63	August 27th	1.46	187
5	Belvidere Estate	6.07	6.66	4.56	4.62	—	9.60	15.04	6.86	16.91	6.19	15.90	12.28	—	September 24th	3.00	—
6	Blair Athol Estate ..	2.37	3.12	1.65	2.80	6.04	4.81	9.75	4.39	10.05	4.01	8.12	8.68	65.79	December 5th	1.95	201
7	Botanic Gardens	1.80	1.82	1.72	1.15	5.16	6.17	7.84	16.31	7.45	1.44	5.76	6.45	63.07	August 15th	9.30	138
8	Boulogne Cocoa Station ...	2.19	3.12	1.49	2.49	5.18	8.61	8.02	3.05	7.17	3.00	8.02	6.55	58.89	June 7th	3.22	179
9	Brothers Estate	5.19	4.07	4.52	4.78	8.13	10.88	14.83	9.31	13.49	4.18	14.90	9.62	103.90	September 30th	3.20	285
10	Calivigny Estate	2.60	1.58	1.90	1.62	4.69	6.62	5.81	8.87	10.65	1.66	5.96	7.23	59.19	September 30th	4.56	188
11	Calliste Estate	1.44	0.81	1.19	0.32	4.04	3.45	5.10	5.98	4.01	1.60	3.31	3.25	34.50	August 1st	1.98	198
12	Craigston Estate, C'cou ...	2.06	—	0.90	1.40	4.39	6.74	5.64	2.11	—	2.64	5.49	4.72	36.09	June 3rd	2.50	—
13	Crayfish Estate	2.97	2.74	1.65	1.95	6.78	8.79	10.39	7.65	11.62	—	11.28	8.24	—	—	—	—
14	Dougaldston Estate ...	4.02	3.53	4.28	3.68	8.97	11.78	16.82	9.06	17.20	4.66	19.50	10.83	114.33	September 30th	4.73	265
15	Dumfries Estate, C'cou ...	2.23	0.85	0.78	1.55	4.30	4.78	5.74	2.50	3.19	2.68	3.65	4.07	36.32	May 17th	2.53	104
16	Dunfermline Estate ..	2.11	2.61	1.87	1.45	5.06	7.63	6.44	2.32	5.24	3.80	6.67	7.20	51.40	June 9th	2.18	111
17	Grand Bacolet Estate ...	4.24	2.02	2.16	2.18	12.06	7.43	9.44	6.96	9.41	2.11	8.86	9.26	76.13	May 17th	2.75	239
18	Grand Etang House ...	6.19	4.47	4.30	5.09	13.40	13.84	13.84	9.37	12.90	7.49	15.60	11.14	117.63	October 1st	3.70	261
19	Hermitage Water Works ...	1.55	2.63	3.28	2.42	7.74	6.81	7.05	5.85	6.50	4.55	7.09	8.32	63.79	May 17th	2.82	220
20	Hope Vale Estate ...	3.62	2.18	2.24	1.15	5.07	7.15	8.32	7.54	10.36	1.87	6.11	3.34	58.95	September 30th	2.42	162
21	L'Ance Aux Epines ...	2.07	1.30	1.55	0.31	5.07	4.42	4.87	7.68	3.03	4.37	6.11	3.44	44.22	October 1st	3.67	125
22	LaSagesse Estate ...	2.78	1.72	2.15	1.37	7.36	6.83	6.30	8.04	7.74	3.33	5.73	7.62	60.97	December 15th	2.56	199
23	Les Avocats Water Works ..	5.40	4.89	4.43	3.53	10.36	10.46	8.10	7.96	—	7.23	9.25	11.17	—	—	—	—
24	Limlair Agricultural Station, Carriacou ...	1.92	0.97	0.96	0.86	4.07	6.06	5.17	2.75	3.65	2.13	5.69	3.15	37.38	June 3rd	1.85	119
25	Lower Marli Estate ..	2.43	2.00	0.89	2.24	6.11	9.19	7.91	4.72	9.55	2.57	7.38	6.30	61.29	June 7th	2.05	188
26	Maran Cocoa Station ...	3.91	3.30	3.79	3.70	6.32	11.04	14.95	9.60	14.51	2.79	11.90	9.29	95.10	September 30th	3.10	279
27	Mirabeau Agric. Station ...	4.10	2.64	2.87	3.30	8.92	7.21	10.26	4.05	14.04	4.23	7.48	7.95	77.05	—	—	—
28	Mt. Horne Cocoa Station ...	2.71	3.16	1.45	2.42	6.15	8.37	9.16	3.76	9.11	3.73	8.24	7.62	65.88	June 8th	2.37	210
29	Mt. Moritz Agric. Station ...	3.63	1.40	1.64	2.10	4.60	9.15	9.00	7.37	11.11	8.40	1.31	6.58	66.29	September 30th	4.80	233
30	Mt. Rich Estate	2.11	3.52	2.47	3.36	4.88	7.25	8.11	4.14	8.46	2.76	8.69	9.33	65.08	November 11th	2.25	204
31	Pomme Rose Water Works	2.19	1.83	2.17	1.54	11.34	—	6.31	5.27	7.52	3.32	—	9.95	—	—	—	—
32	Richmond Hill Water Works	2.44	1.97	4.31	1.87	4.38	6.72	10.66	11.11	6.25	2.92	7.75	7.87	68.25	May 4th	1.45	203
33	Samaritan Estate ...	2.23	3.55	2.11	2.53	6.07	7.76	10.24	5.71	10.65	3.56	12.96	8.99	76.36	November 22nd	2.10	249
34	Simon Estate	2.02	2.26	1.74	2.29	3.88	6.70	5.97	2.13	4.60	2.70	8.13	6.76	49.18	June 9th	1.90	122
35	The Park Estate	4.01	3.56	3.57	2.49	8.09	9.39	9.62	7.64	8.64	8.91	11.02	9.72	86.66	October 1st	4.74	257
36	Tivoli Agric. Station ...	1.29	2.31	1.52	1.38	3.99	5.47	6.61	4.04	5.50	3.63	7.02	7.25	50.01	November 12th	1.54	162
37	Tufton Hall Estate ...	5.20	5.33	4.74	5.56	10.05	13.33	14.62	7.78	14.35	5.33	15.17	12.32	113.78	September 30th	3.68	253
38	Vendomme Water Works ...	4.74	4.40	4.41	4.78	10.25	10.02	12.69	8.63	12.98	8.61	16.36	11.19	109.06	October 1st	4.59	252
39	Westerhall Agric. Station ...	2.54	1.73	2.13	1.42	5.67	6.02	5.81	7.33	11.09	1.57	6.37	6.30	57.98	September 30th	5.30	192
40	Woodlands Estate ...	2.55	1.43	1.85	1.06	1.87	5.75	6.54	6.98	10.53	1.68	5.08	6.98	52.30	—	—	—

APPENDIX II. RESULTS OF CLONAL TRIALS ON COCOA STATIONS, 1960—1961

Clonal Yields in Pounds Dry Cocoa Per acre (Highest Third)

	Mt. Horne		Ashenden		Maran
31(29)	6642	29	4615	18	3130
46	6204	57	3992	48	2877
18	5762	36	3954	24	2490
78	5110	79(29)	3930	36	2454
17	4864	48	2893	78	2185
50	4855	3	2762	61	2126
57	4837	78	2629	69	2126
36	4754	40	2617	77	1964
15	4482	80(40)	2564	6	1960
4	4144	26	2433	1	1905
26	4067	19	2422	49	1905
29	3871	11	1894	75	1905
75	3794	65	1894	53	1901
43	3690	76	1817	57	1877
3	3675	53	1754	17	1850
81(76)	3527	44	1595	50	1850
24	3477	73	1580	66	1834
11	3432	28	1521	32	1830
62	3290	2(19)	1482	72	1822
48	3284	23	1432	73	1747
47	3225	22	1352	67	1695
73	3207	6	1334	27	1672
39	3183	64(24)	1254	19	1648
68	3136	4	1215	43	1632
77	3091	5	1212	70	1601
67	3011	61	1159	58	1585
55	2985	21	1144	4	1577
	4059		2165		1968
Mean					
SED	+ 936.9		+ 569.46		+ 736.9

APPENDIX II. Results of Clonal Trials on Cocoa Stations, 1961—62

Clonal Yields in Pounds Dry Cocoa Per Acre (Highest Third)

	Mt. Horne		Ashenden		Maran
36	6656	36	3277	18	2679
(31)29	5243	(29)79	3180	1	1744
46	5175	29	3175	36	1483
50	4586	46	2768	53	1479
18	4533	48	2761	24	1476
78	4390	57	2682	19	1468
29	4213	3	2527	(53)79	1460
17	3953	40	2510	17	1454
3	3329	(40)80	2428	78	1431
26	3281	50	2249	63	1407
48	3216	19	2112	6	1406
57	3060	69	2037	29	1403
4	3009	76	1976	57	1393
15	2989	55	1918	69	1389
75	2911	26	1548	46	1279
77	2779	78	1831	75	1253
45	2554	65	1569	77	1243
24	2401	(11)10	1561	70	1231
71	2394	11	1462	3	1189
43	2320	17	1456	15	1168
65	3301	24	1447	22	1119
55	2288	54	1430	72	1113
62	2285	44	1398	49	1090
67	2280	22	1294	71	1062
51	2272	53	1163	66	1058
11	2251	70	1161	4	1034
5	2242	66	1147	61	1029
	3293		2013		1353
Mean					
SED	+ 759.41		+ 408.97		+ 334.64

APPENDIX II (Contd.) RESULTS OF CLONAL TRIALS ON COCOA STATIONS, 1962—63

Clonal Yields in Pounds Dry Cocoa Per Acre (Highest Third)

	Mt. Horne		Ashenden		Maran
46	5952	36	5249	18	2682
(31)29	5303	29	5006	46	2157
50	4928	(79)29	4458	22	1971
18	4794	17	3798	32	1758
78	4375	57	3624	78	1651
15	4314	48	3371	61	1622
57	4194	46	3305	1	1551
36	4148	19	2936	29	1518
29	4140	78	2863	15	1489
26	3964	76	2500	53	1410
3	3517	(40)80	2456	6	1403
75	3478	28	2449	66	1347
24	3422	25	2449	75	1345
12	3365	73	2351	67	1335
73	3250	65	2338	(61)80	1332
62	3058	55	2300	19	1317
4	2999	(64)24	2269	26	1291
43	2895	53	2177	72	1288
77	2720	3	2076	16	1284
(81)76	2718	40	1987	59	1246
16	2698	50	1825	50	1230
68	2653	(19)2	1820	3	1200
65	2524	69	1704	37	1200
61	2500	74	1680	77	1186
67	2371	71	1656	58	1168
8	2254	42	1636	9	1132
74	2249	70	1615	47	1123
	3510		2662		1453
Mean					
SED	+ 558.84		+ 369.17		+ 549.20
	—		—		—

APPENDIX II. RESULTS OF CLONAL TRIALS ON COCOA STATIONS, 1963—64

Clonal Yields in Pounds Dry Cocoa Per Acre (Highest Third)

	Mt. Horne		Ashenden		Maran
78	5703	46	3372	18	1715
36	5451	36	2945	75	1302
46	5222	48	2923	6	1256
29	5089	29	2333	53	1255
(31)29	5047	78	2753	19	1209
50	4860	(29)79	2745	78	1198
15	4670	17	2326	36	1161
18	5001	3	2157	(61)80	961
17	4196	65	1858	17	909
57	4012	19	1770	15	906
26	4029	50	1667	50	891
75	3844	53	1639	32	859
3	3631	40	1517	4	835
58	3500	73	1482	77	835
4	3358	(40)80	1402	49	805
24	3012	26	1363	46	795
48	3001	4	1329	57	788
73	2975	55	1237	8	776
62	2880	11	1225	16	758
6	2852	54	1068	61	745
43	2804	74	1062	24	744
54	2782	42	1046	22	728
5	2672	70	1027	9	710
65	2669	6	982	29	652
11	2645	64	968	20	645
77	2592	7	916	59	630
68	2384	67	879	72	625
	3736		1703		914
Mean					
SED	+ 423.01		+ 354.14		+ 291.58
	—		—		—

APPENDIX III

Economic Plants Propagated and Distributed—1960-63

Plants	1960	1961	1962	1963
Clonal Cocoa	439,714	307,100	176,983	238,996
Budded Cocoa seedlings	16,771	4,210	5,450	—
Hybrid Cocoa	728	2,500	7,290	4,957
Total Cocoa Plants	457,203	313,810	189,723	243,953
Nutmeg	4,012	2,449	5,067	3,535
Other spices:				
Pimento	5,552	8,442	669	619
Cloves	21,163	1,083	3,872	1,220
Blackpeppep	824	14	—	—
Cinnamon	—	—	—	—
Tonka Beans	—	—	—	—
Ginger	—	—	—	—
Total Other Spices	27,539	9,539	4,541	1,839
Coffee	84,157	53,714	27,612	12,254
Citrus (All Var.)	57,707	35,377	15,468	14,369
Mango (All Var.)	6,327	2,141	2,775	1,617
Avocado	5,975	1,778	3,883	1,498
Coconuts—Tall	3,635	3,801	2,044	3,291
Dwarf	6,016	944	539	6
Total Coconuts	9,651	4,745	2,583	3,297
Other Economics Crops:				
Sugar Apple	2,355	3,382	1,182	538
Sapodillas	6,295	5,546	1,717	636
Breadnut	48	—	—	—
Soursop	—	—	—	—
Guava	—	—	—	—
Total other economic crops	8,698	8,928	2,899	1,174